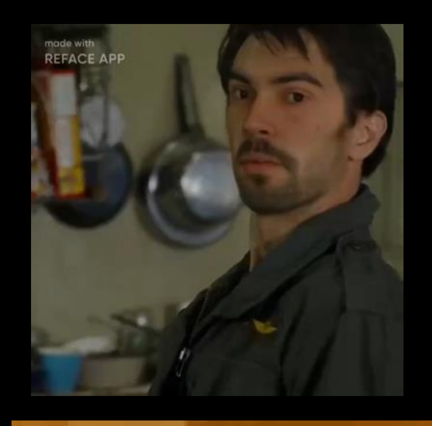
Как два бита передать

Илья Черторыльский

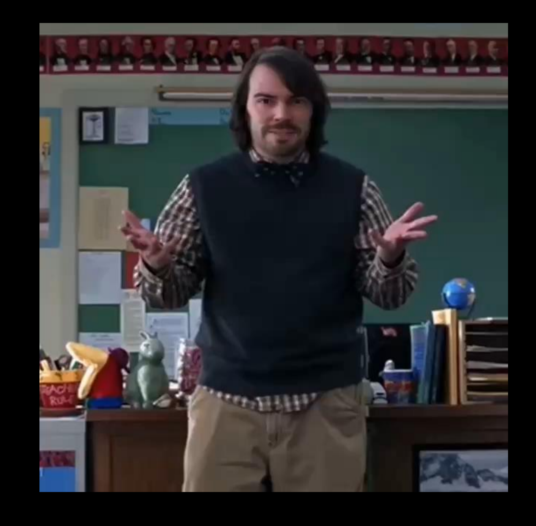



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Как два бита передать

Что же ты скрываешь, файл?

```
address    00 01 02 03 04 05 06 07  08 09 10 11 12 13 14 15   ASCII
00000000   50 4b 03 04 14 00 00 00  08 00 5a 15 4c 55 a2 c7   PK.......ZLU..
00000010   35 95 e6 00 00 00 5f 01  00 00 0a 00 00 00 69 6e   5....._........in
00000020   64 65 78 2e 68 74 6d 6c  55 90 b1 4e 03 31 0c 86   dex.htmlU..N.1..
00000030   77 24 de 21 78 26 3d d8  18 92 93 50 5b 24 26 18   w$.!x&=...P[$&
00000040   5a 09 c6 34 71 7b 46 b9  e4 48 dc 2b 7d 7b 72 81   Z..4q{F..H.+}{r.
00000050   56 6d 16 c7 f6 ff fd b2  ad ee 16 6f f3 d5 e7 fb   Vm.......o....
00000060   52 74 dc fb f6 f6 46 4d  51 78 13 76 1a 30 40 ad   Rt....FMQx.v0@.
00000070   a0 71 25 8a f2 54 8f 6c  84 ed 4c ca c8 1a d6 ab   .q%..T.l..L....
00000080   17 f9 04 97 bd 62 c3 83  c4 ef 3d 8d 1a 3e e4 fa   ....b....=.>..
00000090   59 ce 63 3f 18 a6 8d 47  10 36 06 c6 50 c0 d7 a5   Y.c?..G.6..P...
000000a0   46 b7 c3 6b 34 98 1e 35  8c 84 87 21 26 be 50 1f   F..k4.5...!&.P
000000b0   c8 71 a7 1d 8e 64 51 d6  e4 5e 50 20 26 e3 65 b6   .q..dQ..^P &.e.
000000c0   c6 a3 7e 9c 3d 9c bd 98  d8 63 bb 88 76 df 17 5a   ..~.=....c..v.Z
000000d0   35 35 3f 35 b3 4d 34 b0  c8 c9 6a a0 e0 f0 67 f6   55?5.M4...j...g.
000000e0   95 41 98 7c 0c 56 38 dc  6e 31 b5 aa f9 13 4d ab   .A.|.V8.n1....M.
000000f0   37 ff bb ab 4d 74 c7 93  87 a3 51 90 d3 30 cd 67   7...Mt....Q..0.g
00000100   28 60 82 c2 94 62 05 26  61 fd d4 7b fe 02 50 4b   (`...b.&a..{..PK
00000110   03 04 14 00 00 00 08 00  a0 a3 4c 55 54 6f b7 e4   .........LUTo..
00000120   16 02 00 00 8f 04 00 00  08 00 00 00 69 6e 64 65   ...........inde
00000130   78 2e 6a 73 75 93 5d 6f  da 30 14 86 ef 91 f8 0f   x.jsu.]o.0.....
```

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000000	50	4b	03	04	14	00	00	00	08	00	5a	15	4c	55	a2	c7	PK.......ZLU..
00000010	35	95	e6	00	00	00	5f	01	00	00	0a	00	00	00	69	6e	5....._.......in
00000020	64	65	78	2e	68	74	6d	6c	55	90	b1	4e	03	31	0c	86	dex.htmlU..N.1..
00000030	77	24	de	21	78	26	3d	d8	18	92	93	50	5b	24	26	18	w$.!x&=...P[$&
00000040	5a	09	c6	34	71	7b	46	b9	e4	48	dc	2b	7d	7b	72	81	Z..4q{F..H.+}{r.
00000050	56	6d	16	c7	f6	ff	fd	b2	ad	ee	16	6f	f3	d5	e7	fb	Vm.......o....
00000060	52	74	dc	fb	f6	f6	46	4d	51	78	13	76	1a	30	40	ad	Rt....FMQx.v0@.
00000070	a0	71	25	8a	f2	54	8f	6c	84	ed	4c	ca	c8	1a	d6	ab	.q%..T.l..L....
00000080	17	f9	04	97	bd	62	c3	83	c4	ef	3d	8d	1a	3e	e4	fa	....b....=.>..
00000090	59	ce	63	3f	18	a6	8d	47	10	36	06	c6	50	c0	d7	a5	Y.c?..G.6..P...
000000a0	46	b7	c3	6b	34	98	1e	35	8c	84	87	21	26	be	50	1f	F..k4.5...!&.P
000000b0	c8	71	a7	1d	8e	64	51	d6	e4	5e	50	20	26	e3	65	b6	.q..dQ..^P &.e.
000000c0	c6	a3	7e	9c	3d	9c	bd	98	d8	63	bb	88	76	df	17	5a	..~.=....c..v.Z
000000d0	35	35	3f	35	b3	4d	34	b0	c8	c9	6a	a0	e0	f0	67	f6	55?5.M4...j...g.
000000e0	95	41	98	7c	0c	56	38	dc	6e	31	b5	aa	f9	13	4d	ab	.A.|.V8.n1....M.
000000f0	37	ff	bb	ab	4d	74	c7	93	87	a3	51	90	d3	30	cd	67	7...Mt....Q..0.g
00000100	28	60	82	c2	94	62	05	26	61	fd	d4	7b	fe	02	50	4b	(`...b.&a..{..PK
00000110	03	04	14	00	00	00	08	00	a0	a3	4c	55	54	6f	b7	e4	.........LUTo..
00000120	16	02	00	00	8f	04	00	00	08	00	00	00	69	6e	64	65	...........inde
00000130	78	2e	6a	73	75	93	5d	6f	da	30	14	86	ef	91	f8	0f	x.jsu.]o.0.....

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000000	50	4b	03	04	14	00	00	00	08	00	5a	15	4c	55	a2	c7	PK.......ZLU..
00000010	35	95	e6	00	00	00	5f	01	00	00	0a	00	00	00	69	6e	5....._.......in
00000020	64	65															tmlU..N.1..
00000030																	&=...P[$&
00000040	5a	09															{F..H.+}{r.
00000050	56	6d	16	c7	f6	ff	fd	b2	ad	ee	16	6f	f3	d5	e7	fb	Vm.......o....
00000060	52	74	dc	fb	f6	f6	46	4d	51	78	13	76	1a	30	40	ad	Rt....FMQx.v0@.
00000070	a0	71	25	8a	f2	54	8f	6c	84	ed	4c	ca	c8	1a	d6	ab	.q%..T.l..L....
00000080	17	f9	04	97	bd	62	c3	83	c4	ef	3d	8d	1a	3e	e4	fa	....b....=.>..
00000090	59	ce	63	3f	18	a6	8d	47	10	36	06	c6	50	c0	d7	a5	Y.c?..G.6..P...
000000a0	46	b7	c3	6b	34	98	1e	35	8c	84	87	21	26	be	50	1f	F..k4.5...!&.P
000000b0	c8	71	a7	1d	8e	64	51	d6	e4	5e	50	20	26	e3	65	b6	.q..dQ..^P &.e.
000000c0	c6	a3	7e	9c	3d	9c	bd	98	d8	63	bb	88	76	df	17	5a	..~.=....c..v.Z
000000d0	35	35	3f	35	b3	4d	34	b0	c8	c9	6a	a0	e0	f0	67	f6	55?5.M4...j...g.
000000e0	95	41	98	7c	0c	56	38	dc	6e	31	b5	aa	f9	13	4d	ab	.A.|.V8.n1....M.
000000f0	37	ff	bb	ab	4d	74	c7	93	87	a3	51	90	d3	30	cd	67	7...Mt....Q..0.g
00000100	28	60	82	c2	94	62	05	26	61	fd	d4	7b	fe	02	50	4b	(`...b.&a..{..PK
00000110	03	04	14	00	00	00	08	00	a0	a3	4c	55	54	6f	b7	e4	.........LUTo..
00000120	16	02	00	00	8f	04	00	00	08	00	00	00	69	6e	64	65	...........inde
00000130	78	2e	6a	73	75	93	5d	6f	da	30	14	86	ef	91	f8	0f	x.jsu.]o.0.....

parseInt('00000030', 16) = 48

```
address   00 01 02 03 04 05 06 07  08 09 10 11 12 13 14 15   ASCII
00000000  50 4b 03 04 14 00 00 00  08 00 5a 15 4c 55 a2 c7   PK.......ZLU..
00000010  35 95 e6 00 00 00 5f 01  00 00 0a 00 00 00 69 6e   5....._.......in
00000020  64 65 78 2e 68 74 6d 6c  55 90 b1 4e 03 31 0c 86   dex.htmlU..N.1..
00000030  77 24 de 21 78 26 3d d8  18 92 93 50 5b 24 26 18   w$.!x&=...P[$&
00000040  5a 09 c6 34 71 7b 46 b9  e4 48 dc 2b 7d 7b 72 81   Z..4q{F..H.+}{r.
00000050  56 6d 16 c7 f6 ff fd b2  ad ee 16 6f f3 d5 e7 fb   Vm.......o....
00000060  52 74 dc fb f6 f6 46 4d  51 78 13 76 1a 30 40 ad   Rt....FMQx.v0@.
00000070  a0 71 25 8a f2 54 8f 6c  84 ed 4c ca c8 1a d6 ab   .q%..T.l..L....
00000080  17 f9 04 97 bd 62 c3 83  c4 ef 3d 8d 1a 3e e4 fa   ....b....=.>..
00000090  59 ce 63 3f 18 a6 8d 47  10 36 06 c6 50 c0 d7 a5   Y.c?..G.6..P...
000000a0  46 b7 c3 6b 34 98 1e 35  8c 84 87 21 26 be 50 1f   F..k4.5...!&.P
000000b0  c8 71 a7 1d 8e 64 51 d6  e4 5e 50 20 26 e3 65 b6   .q..dQ..^P &.e.
000000c0  c6 a3 7e 9c 3d 9c bd 98  d8 63 bb 88 76 df 17 5a   ..~.=....c..v.Z
000000d0  35 35 3f 35 b3 4d 34 b0  c8 c9 6a a0 e0 f0 67 f6   55?5.M4...j...g.
000000e0  95 41 98 7c 0c 56 38 dc  6e 31 b5 aa f9 13 4d ab   .A.|.V8.n1....M.
000000f0  37 ff bb ab 4d 74 c7 93  87 a3 51 90 d3 30 cd 67   7...Mt....Q..0.g
00000100  28 60 82 c2 94 62 05 26  61 fd d4 7b fe 02 50 4b   (`...b.&a..{..PK
00000110  03 04 14 00 00 00 08 00  a0 a3 4c 55 54 6f b7 e4   .........LUTo..
00000120  16 02 00 00 8f 04 00 00  08 00 00 00 69 6e 64 65   ...........inde
00000130  78 2e 6a 73 75 93 5d 6f  da 30 14 86 ef 91 f8 0f   x.jsu.]o.0.....
```

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000000	50	4b	03	04	14	00	00	00	08	00	5a	15	4c	55	a2	c7	PK......ZLU..
00000010	35	95	e6	00	00	00	5f	01	00	00	0a	00	00	00	69	6e	5....._.......in
00000020	64	65	78	2e	68	74	6d	6c	55	90	b1	4e	03	31	0c	86	dex.htmlU..N.1..
00000030	77	24	de	21	78	26	3d	d8	18	92	93	50	5b	24	26	18	w$.!x&=...P[$&
00000040	5a	09	c6	34	71	7b	46	b9	e4	48	dc	2b	7d	7b	72	81	Z..4q{F..H.+}{r.
00000050	56	6d	16	c7	f6	ff	fd	b2	ad	ee	16	6f	f3	d5	e7	fb	Vm.......o....
00000060	52	74	dc	fb	f6	f6	46	4d	51	78	13	76	1a	30	40	ad	Rt....FMQx.v0@.
00000070	a0	71	25	8a	f2	54	8f	6c	84	ed	4c	ca	c8	1a	d6	ab	.q%..T.l..L....
00000080	17	f9	04	97	bd	62	c3	83	c4	ef	3d	8d	1a	3e	e4	fa	....b....=.>..
00000090	59	ce	63	3f	18	a6	8d	47	10	36	06	c6	50	c0	d7	a5	Y.c?..G.6..P...
000000a0	46	b7	c3	6b	34	98	1e	35	8c	84	87	21	26	be	50	1f	F..k4.5...!&.P
000000b0	c8	71	a7	1d	8e	64	51	d6	e4	5e	50	20	26	e3	65	b6	.q..dQ..^P &.e.
000000c0	c6	a3	7e	9c	3d	9c	bd	98	d8	63	bb	88	76	df	17	5a	..~.=....c..v.Z
000000d0	35	35	3f	35	b3	4d	34	b0	c8	c9	6a	a0	e0	f0	67	f6	55?5.M4...j...g.
000000e0	95	41	98	7c	0c	56	38	dc	6e	31	b5	aa	f9	13	4d	ab	.A.|.V8.n1....M.
000000f0	37	ff	bb	ab	4d	74	c7	93	87	a3	51	90	d3	30	cd	67	7...Mt....Q..0.g
00000100	28	60	82	c2	94	62	05	26	61	fd	d4	7b	fe	02	50	4b	(`...b.&a..{..PK
00000110	03	04	14	00	00	00	08	00	a0	a3	4c	55	54	6f	b7	e4	.........LUTo..
00000120	16	02	00	00	8f	04	00	00	08	00	00	00	69	6e	64	65	...........inde
00000130	78	2e	6a	73	75	93	5d	6f	da	30	14	86	ef	91	f8	0f	x.jsu.]o.0.....

```
address   00 01 02 03 04 05 06 07  08 09 10 11 12 13 14 15   ASCII
00000000  50 4b 03 04 14 00 00 00  08 00 5a 15 4c 55 a2 c7   PK......ZLU..
00000010  35 95 e6 00 00 00 5f 01  00 00 0a 00 00 00 69 6e   5....._.......in
00000020  64 65 78 2e 68 74 6d 6c  55 90 b1 4e 03 31 0c 86   dex.htmlU..N.1..
00000030  77 24 de 21 78 26 3d d8  18 92 93 50 5b 24 26 18   w$.!x&=...P[$&
00000040  5a 09 c6 34 71 7b 46 b9  e4 48 dc 2b 7d 7b 72 81   Z..4q{F..H.+}{r.
00000050  56 6d 16 c7 f6 ff fd b2  ad ee 16 6f f3 d5 e7 fb   Vm.......o....
00000060  52 74 dc fb f6 f6 46 4d  51 78 13 76 1a 30 40 ad   Rt....FMQx.v0@.
00000070  a0 71 25 8a f2 54 8f 6c  84 ed 4c ca c8 1a d6 ab   .q%..T.l..L.....
00000080  17 f9 04 97 bd 62 c3 83  c4 ef 3d 8d 1a 3e e4 fa   ....b....=.>..
00000090  59 ce 63 3f 18 a6 8d 47  10 36 06 c6 50 c0 d7 a5   Y.c?..G.6..P...
000000a0  46 b7 c3 6b 34 98 1e 35  8c 84 87 21 26 be 50 1f   F..k4.5...!&.P
000000b0  c8 71 a7 1d 8e 64 51 d6  e4 5e 50 20 26 e3 65 b6   .q..dQ..^P &.e.
000000c0  c6 a3 7e 9c 3d 9c bd 98  d8 63 bb 88 76 df 17 5a   ..~.=....c..v.Z
000000d0  35 35 3f 35 b3 4d 34 b0  c8 c9 6a a0 e0 f0 67 f6   55?5.M4...j...g.
000000e0  95 41 98 7c 0c 56 38 dc  6e 31 b5 aa f9 13 4d ab   .A.|.V8.n1....M.
000000f0  37 ff bb ab 4d 74 c7 93  87 a3 51 90 d3 30 cd 67   7...Mt....Q..0.g
00000100  28 60 82 c2 94 62 05 26  61 fd d4 7b fe 02 50 4b   (`...b.&a..{..PK
00000110  03 04 14 00 00 00 08 00  a0 a3 4c 55 54 6f b7 e4   .........LUTo..
00000120  16 02 00 00 8f 04 00 00  08 00 00 00 69 6e 64 65   ............inde
00000130  78 2e 6a 73 75 93 5d 6f  da 30 14 86 ef 91 f8 0f   x.jsu.]o.0.....
```

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000000	50	4b	03	04	14	00	00	00	08	00	5a	15	4c	55	a2	c7	PK.......ZLU..
00000010	35	95	e6	00	00	00	5f	01	00	00	0a	00	00	00	69	6e	5....._.........in
00000020	64	65	78	2e	68	74	6d	6c	55	90	b1	4e	03	31	0c	86	dex.htmlU..N.1..
00000030	77	24	de	21	78	26	3d	d8	18	92	93	50	5b	24	26	18	w$.!x&=...P[$&
00000040	5a	09	c6	34	71	7b	46	b9	e4	48	dc	2b	7d	7b	72	81	Z..4q{F..H.+}{r.
00000050	56	6d	16	c7	f6	ff	fd	b2							e7	fb	Vm.......o....
00000060	52	74	dc	fb	f6	f6	46	4d							40	ad	Rt....FMQx.v0@.
00000070	a0	71	25	8a	f2	54	8f	6c							d6	ab	.q%..T.l..L....
00000080	17	f9	04	97	bd	62	c3	83							e4	fa	....b....=.>..
00000090	59	ce	63	3f	18	a6	8d	47							d7	a5	Y.c?..G.6..P...
000000a0	46	b7	c3	6b	34	98	1e	35							50	1f	F..k4.5...!&.P
000000b0	c8	71	a7	1d	8e	64	51	d6							65	b6	.q..dQ..^P &.e.
000000c0	c6	a3	7e	9c	3d	9c	bd	98							17	5a	..~.=....c..v.Z
000000d0	35	35	3f	35	b3	4d	34	b0							67	f6	55?5.M4...j...g.
000000e0	95	41	98	7c	0c	56	38	dc	6e	31	b5	aa	f9	13	4d	ab	.A.|.V8.n1....M.
000000f0	37	ff	bb	ab	4d	74	c7	93	87	a3	51	90	d3	30	cd	67	7...Mt....Q..0.g
00000100	28	60	82	c2	94	62	05	26	61	fd	d4	7b	fe	02	50	4b	(`...b.&a..{..PK
00000110	03	04	14	00	00	00	08	00	a0	a3	4c	55	54	6f	b7	e4	.........LUTo..
00000120	16	02	00	00	8f	04	00	00	08	00	00	00	69	6e	64	65	............inde
00000130	78	2e	6a	73	75	93	5d	6f	da	30	14	86	ef	91	f8	0f	x.jsu.]o.0......

U+0069 = i
U+006e = n
U+0064 = d
U+0065 = e
U+0078 = x
U+002e = .
U+006a = j
U+0073 = s

Напишем HEX-просмотрщик

```javascript
const input = document.createElement('input');
input.type = 'file';
document.body.append(input);

input.addEventListener('input', async (event) => {
    const file = input.files[0];
    if (file instanceof File) {
        const buffer = await file.arrayBuffer();
        const view = new Uint8Array(buffer);
        const decoder = new TextDecoder();
        const hex = Array.from(view)
            .map(int => int.toString(16).padStart(2, '0'))
            .reduce((prev, cur, idx) => {
                // немного магии с выравниванием и внешним видом результата
            }, '');
        console.log(hex);
    }
});
```

```
const input = document.createElement('input');
input.type = 'file';
document.body.append(input);

input.addEventListener('input', async (event) => {
    const file = input.files[0];
    if (file instanceof File) {
        const buffer = await file.arrayBuffer();
        const view = new Uint8Array(buffer);
        const decoder = new TextDecoder();
        const hex = Array.from(view)
            .map(int => int.toString(16).padStart(2, '0'))
            .reduce((prev, cur, idx) => {
                // немного магии с выравниванием и внешним видом результата
            }, '');
        console.log(hex);
    }
});
```

```
const input = document.createElement('input');
input.type = 'file';
document.body.append(input);

input.addEventListener('input', async (event) => {
    const file = input.files[0];
    if (file instanceof File) {
        const buffer = await file.arrayBuffer();
        const view = new Uint8Array(buffer);
        const decoder = new TextDecoder();
        const hex = Array.from(view)
            .map(int => int.toString(16).padStart(2, '0'))
            .reduce((prev, cur, idx) => {
                // немного магии с выравниванием и внешним видом результата
            }, '');
        console.log(hex);
    }
});
```

```
const input = document.createElement('input');
input.type = 'file';
document.body.append(input);

input.addEventListener('input', async (event) => {
    const file = input.files[0];
    if (file instanceof File) {
        const buffer = await file.arrayBuffer();
        const view = new Uint8Array(buffer);
        ...r();
        ...).padStart
        ... {
            // немного магии с выравниванием и внешним видом результата
        }, '');
        console.log(hex);
    }
});
```

File

```
new File(bits, name, options)
```

Blob

```
new Blob(array, options)
```

```javascript
const input = document.createElement('input');
input.type = 'file';
document.body.append(input);

input.addEventListener('input', async (event) => {
    const file = input.files[0];
    if (file instanceof File) {
        const buffer = await file.arrayBuffer();
        const view = new Uint8Array(buffer);
        const decoder = new TextDecoder();
        const hex = Array.from(view)
            .map(int => int.toString(16).padStart(2, '0'))
            .reduce((prev, cur, idx) => {
                // немного магии с выравниванием и внешним видом результата
            }, '');
        console.log(hex);
    }
});
```

```
const input = document.createElement('input');
input.type = 'file';
document.body.append(input);

input.addEventListener('input', async (event) => {
    const file = input.files[0];
    if (file instanceof F
        const buffer = aw
        const view = new
        const decoder = n
        const hex = Array
            .map(int => i
            .reduce((prev
                // немного магии с выравниванием и внешним видом результата
            }, '');
        console.log(hex);
    }
});
```

ArrayBuffer

```
new ArrayBuffer(length)

new SharedArrayBuffer(length)
```

```javascript
const input = document.createElement('input');
input.type = 'file';
document.body.append(input);

input.addEventListener('input', async (event) => {
    const file = input.files[0];
    if (file instanceof File) {
        const buffer = await file.arrayBuffer();
        const view = new Uint8Array(buffer);
        const decoder = new TextDecoder();
        const hex = Array.from(view)
            .map(int => int.toString(16).padStart(2, '0'))
            .reduce((prev, cur, idx) => {
                // немного магии с выравниванием и внешним видом результата
            }, '');
        console.log(hex);
    }
});
```

```
const input = document.createElement('input');
```

TypedArrays

ArrayBuffer(16)																
Uint8Array	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Uint16Array	0		1		2		3		4		5		6		7	
Uint32Array	0				1				2				3			
Uint64Array	0								1							

1 байт = 8 бит parseInt('11111111',2) = 255

Uint32Array	**00000000 00000000 0000000 0000000**	**00000000 00000000 0000000 0000000**

```
const input = document.createElement('input');
in
do

in

})
```

TypedArrays

ArrayBuffer(16)																
Uint8Array	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Uint16Array	0		1		2		3		4		5		6		7	
Uint32Array	0				1				2				3			
Uint64Array	0								1							

U = unsigned

Uint8Array = [0, 255]

parseInt('11111111’,2) = 255

Int8Array = [-127, 127]

parseInt('1111111’,2) = 127

const input = document.createElement('input');
in
do

in

})

TypedArrays

ArrayBuffer(16)																
Uint8Array	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Uint16Array	0		1		2		3		4		5		6		7	
Uint32Array	0				1				2				3			
Uint64Array	0								1							

Uint8ClampedArray

```
> (-45).toString(2)
<· '-101101'
> parseInt('-101101', 2)
<· -45
> parseInt('101101', 2)
<· 45
```

```
var x = new Uint8ClampedArray([17, -45.3]);
console.log(x[0]); // 17
console.log(x[1]); // 0

var x = new Uint8Array([17, -45.3]);
console.log(x[0]); // 17
console.log(x[1]); // 211
```

```
const input = document.createElement('input');
input.type = 'file';
document.body.append(input);

input.addEventListener('input', async (event) => {
    const file = input.files[0];
    if (file instanceof File) {
        const buffer = await file.arrayBuffer();
        const view = new Uint8Array(buffer);
        const decoder = new TextDecoder();
        const hex = Array.from(view)
            .map(int => int.toString(16).padStart(2, '0'))
            .reduce((prev, cur, idx) => {
                // немного магии с выравниванием и внешним видом результата
            }, '');
        console.log(hex);
    }
});
```

```
const input = document.createElement('input');
input.type = 'file';
document.body.append(input);

input.addEventListener('input', async (event) => {
    const file = input.files[0];
```

TextDecoder

```
const encoder = new TextEncoder();
encoder.encode(str);
encoder.encodeInto(str, uint8);
```

TextEncoder

```
const decoder = new TextDecoder();
decoder.decode(buffer, opt);
```

```
    }
});
```

```
const input = document.createElement('input');
input.type = 'file';
document.body.append(input);

input.addEventListener('input', async (event) => {
    const file = input.files[0];
    if (file instanceof File) {
        const buffer = await file.arrayBuffer();
        const view = new Uint8Array(buffer);
        const decoder = new TextDecoder();
        const hex = Array.from(view)
            .map(int => int.toString(16).padStart(2, '0'))
            .reduce((prev, cur, idx) => {
                // немного магии с выравниванием и внешним видом результата
            }, '');
        console.log(hex);
    }
});
```

```
const input = document.createElement('input');
input.type = 'file';
document.body.append(input);

input.addEventListener('input', async (event) => {
    const file = input.files[0];
    if (file instanceof File) {
        const buffer = await file.arrayBuffer();
        const view = new Uint8Array(buffer);
        const decoder = new TextDecoder();
        const hex = Array.from(view)
            .map(int => int.toString(16).padStart(2, '0'))
            .reduce((prev, cur, idx) => {
                // немного магии с выравниванием и внешним видом результата
            }, '');
        console.log(hex);
    }
});
```

Выберите файл index.js

Элементы | Консоль | Recorder | Performance insights | Источники | Сеть

top | Фильтр | Уровни по умолчанию | 1 проблема: 1 | 1 скрыто

index.js:23

```
63 6f 6e 73 74 20 69 6e   70 75 74 20 3d 20 64 6f   const input = do
63 75 6d 65 6e 74 2e 63   72 65 61 74 65 45 6c 65   cument.createEle
6d 65 6e 74 28 27 69 6e   70 75 74 27 29 3b 0d 0a   ment('input');..
69 6e 70 75 74 2e 74 79   70 65 20 3d 20 27 66 69   input.type = 'fi
6c 65 27 3b 0d 0a 64 6f   63 75 6d 65 6e 74 2e 62   le';..document.b
6f 64 79 2e 61 70 70 65   6e 64 28 69 6e 70 75 74   ody.append(input
29 3b 0d 0a 0d 0a 69 6e   70 75 74 2e 61 64 64 45   );....input.addE
76 65 6e 74 4c 69 73 74   65 6e 65 72 28 27 69 6e   ventListener('in
70 75 74 27 2c 20 61 73   79 6e 63 20 28 65 76 65   put', async (eve
6e 74 29 20 3d 3e 20 7b   0d 0a 20 20 20 20 63 6f   nt) => {..    co
6e 73 74 20 66 69 6c 65   20 3d 20 69 6e 70 75 74   nst file = input
2e 66 69 6c 65 73 5b 30   5d 3b 0d 0a 20 20 20 20   .files[0];..
69 66 20 28 66 69 6c 65   20 69 6e 73 74 61 6e 63   if (file instanc
65 6f 66 20 46 69 6c 65   29 20 7b 0d 0a 20 20 20   eof File) {..
20 20 20 20 20 63 6f 6e   73 74 20 62 75 66 66 65        const buffe
72 20 3d 20 61 77 61 69   74 20 66 69 6c 65 2e 61   r = await file.a
72 72 61 79 42 75 66 66   65 72 28 29 3b 0d 0a 20   rrayBuffer();..
20 20 20 20 20 20 20 63   6f 6e 73 74 20 76 69 65          const vie
77 20 3d 20 6e 65 77 20   55 69 6e 74 38 41 72 72   w = new Uint8Arr
61 79 28 62 75 66 66 65   72 29 3b 0d 0a 20 20 20   ay(buffer);..
20 20 20 20 20 63 6f 6e   73 74 20 64 65 63 6f 64        const decod
65 72 20 3d 20 6e 65 77   20 54 65 78 74 44 65 63   er = new TextDec
6f 64 65 72 28 29 3b 0d   0a 20 20 20 20 20 20 20   oder();..
20 63 6f 6e 73 74 20 68   65 78 20 3d 20 41 72 72    const hex = Arr
61 79 2e 66 72 6f 6d 28   76 69 65 77 29 0d 0a 20   ay.from(view)..
20 20 20 20 20 20 20 20   20 20 20 2e 6d 61 70 28              .map(
69 6e 74 20 3d 3e 20 69   6e 74 2e 74 6f 53 74 72   int => int.toStr
69 6e 67 28 31 36 29 2e   70 61 64 53 74 61 72 74   ing(16).padStart
28 32 2c 20 27 30 27 29   29 0d 0a 20 20 20 20 20   (2, '0'))..
20 20 20 20 20 20 20 2e   72 65 64 75 63 65 28 28          .reduce((
70 72 65 76 2c 20 63 75   72 2c 20 69 64 78 29 20   prev, cur, idx)
3d 3e 20 7b 0d 0a 20 20   20 20 20 20 20 20 20 20   => {..
20 20 20 20 20 20 63 6f   6e 73 74 20 69 73 38 20         const is8
3d 20 2b 2b 69 64 78 20   25 20 38 3b 0d 0a 20 20   = ++idx % 8;..
20 20 20 20 20 20 20 20   20 20 20 20 20 20 63 6f                 co
6e 73 74 20 69 73 31 36   20 3d 20 69 64 78 20 25   nst is16 = idx %
20 31 36 3b 0d 0a 20 20   20 20 20 20 20 20 20 20    16;..
20 20 20 20 20 20 63 6f   6e 73 74 20 73 65 70 61         const sepa
74 6f 72 20 3d 20 21 69   73 38 20 3f 20 27 20 20   tor = !is8 ? '
20 20 27 20 3a 20 27 27   3b 0d 0a 20 20 20 20 20     ' : '';..
20 20 20 20 20 20 20 20   20 20 20 6c 65 74 20 73              let s
74 72 20 3d 20 21 28 69   73 31 36 20 26 26 20 69   tr = !(is16 && i
64 78 20 21 3d 3d 20 76   69 65 77 2e 6c 65 6e 67   dx !== view.leng
74 68 29 20 3f 20 60 20   24 7b 64 65 63 6f 64 65   th) ? ` ${decode
72 2e 64 65 63 6f 64 65   28 76 69 65 77 2e 73 6c   r.decode(view.sl
69 63 65 28 69 64 78 20   2d 20 28 21 69 73 31 36   ice(idx - (!is16
20 3f 20 31 36 20 3a 20   69 73 31 36 29 2c 20 69    ? 16 : is16), i
64 78 29 2e 62 75 66 66   65 72 29 2e 72 65 70 6c   dx).buffer).repl
61 63 65 28 2f 5c 72 7c   5c 6e 2f 67 2c 20 27 2e   ace(/\r|\n/g, '.
27 29 7d 24 7b 21 69 73   31 36 20 3f 20 27 5c 6e   ')}${!is16 ? '\n
27 20 3a 20 27 27 7d 60   20 3a 20 27 27 0d 0a 20   ' : ''}` : ''..
20 20 20 20 20 20 20 20   20 20 20 20 20 20 20 70                  p
72 65 76 20 2b 3d 20 60   24 7b 63 75 72 7d 24 7b   rev += `${cur}${
73 65 70 61 74 6f 72 7d   20 60 3b 0d 0a 20 20 20   sepator} `;..
20 20 20 20 20 20 20 20   20 20 20 20 20 73 74 72                str
20 3d 20 69 64 78 20 3d   3d 3d 20 76 69 65 77 2e    = idx === view.
6c 65 6e 67 74 68 20 3f   20 27 27 2e 70 61 64 53   length ? ''.padS
74 61 72 74 28 37 33 20   2d 20 73 74 72 2e 6c 65   tart(73 - str.le
6e 67 74 68 20 2d 20 28   70 72 65 76 2e 6c 65 6e   ngth - (prev.len
67 74 68 20 2d 20 70 72   65 76 2e 6c 61 73 74 49   gth - prev.lastI
6e 64 65 78 4f 66 28 27   5c 6e 27 29 29 2c 20 27   ndexOf('\n')), '
```

Консоль | What's New | Проблемы | Поиск | Условия работы сети

Напишем HEX-редактор

```javascript
const input = document.createElement('input');
input.type = 'file';
document.body.append(input);

const a = document.createElement('a');
a.innerText = 'скачать';
document.body.append(a);

input.addEventListener('input', async (event) => {
    const file = input.files[0];
    if (file instanceof File) {
        const buffer = await file.arrayBuffer();
        const view = new Uint8Array(buffer);
        const dv = new DataView(buffer);
        const container = document.createElement('div');
        container.classList.add('container');
        container.style.display = 'none';
        document.body.append(container);

        await new Promise(resolve => {
            let bytes = '';
            let chars = '';
            let int = '';
            const temp = document.createElement('div');

            for (let idx = 0; idx <= view.length - 1; idx++) {
                int = view[idx];
                char = String.fromCharCode(int).replace(/\W/gm, '.');
                const i8 = dv.getInt8(idx);
                const i16 = view.length - idx >= 2 ? dv.getInt16(idx) : 'EOF';
                const i32 = view.length - idx >= 4 ? dv.getInt32(idx) : 'EOF';
                const i16l = view.length - idx >= 2 ? dv.getInt16(idx, true) : 'EOF';
                const i32l = view.length - idx >= 4 ? dv.getInt32(idx, true) : 'EOF';
                title = `big-endian\nint8=${i8} int16=${i16} int32=${i32}\nlittle-endian\nint16=${i16l} int32=${i32l}`
                bytes += `<div id="${idx}b" data-title="${title}" class="byte">${int.toString(16).padStart(2, '0')}</div>`;
                chars += `<span id="${idx}u" data-title="${title}" class="char">${char}</span>`;
                if ((idx && !((idx + 1) % 16)) || idx === view.length - 1) {
                    temp.innerHTML = `<div id="${(idx - 15).toString(16).padStart(8, '0')}" class="bytes"><div class="part">${bytes}</div>${chars}</div>`;
                    container.append(temp.firstChild);
                    bytes = '';
                    chars = '';
                    continue;
                }
            }
            resolve();
        });

        container.style.display = '';

        document.querySelectorAll('[id$=b]').forEach(el => el.addEventListener('mouseover', ({ target }) => target.parentElement.parentElement.querySelector(`[id = "${parseInt(el.id)}u"]`)?.classList.add('hover')));
        document.querySelectorAll('[id$=b]').forEach(el => el.addEventListener('mouseleave', ({ target }) => target.parentElement.parentElement.querySelector(`[id = "${parseInt(el.id)}u"]`)?.classList.remove('hover')));
        document.querySelectorAll('[id$=u]').forEach(el => el.addEventListener('mouseover', ({ target }) => target.parentElement.querySelector(`[id = "${parseInt(el.id)}b"]`)?.classList.add('hover')));
        document.querySelectorAll('[id$=u]').forEach(el => el.addEventListener('mouseleave', ({ target }) => target.parentElement.querySelector(`[id = "${parseInt(el.id)}b"]`)?.classList.remove('hover')));

        document.querySelectorAll('[id$=b]').forEach(el => el.addEventListener('click', ({ target }) => {
            const value = prompt();
            const offset = parseInt(target.id)
            // dv.setUint8(offset, parseInt(value, 16));
            dv.setInt16(offset, value, true);
            a.download = file.name;
            a.href = URL.createObjectURL(new File([buffer], file.name));
        }));

    }
});
```

```
const input = document.createElement('input');
input.type = 'file';
document.body.append(input);

const a = document.createElement('a');
a.innerText = 'скачать';
document.body.append(a);

input.addEventListener('input', async (event) => {
    const file = input.files[0];
    if (file instanceof File) {
        const buffer = await file.arrayBuffer();
        const view = new Uint8Array(buffer);
        const dv = new DataView(buffer);
        const container = document.createElement('div');
        container.classList.add('container');
        container.style.display = 'none';
        document.body.append(container);

        await new Promise(resolve => {
            let bytes = '';
            let chars = '';
            let int = '';
            const temp = document.createElement('div');

            for (let idx = 0; idx <= view.length - 1; idx++) {
                int = view[idx];
                char = String.fromCharCode(int).replace(/\W/gm, '.');
                const i8 = dv.getInt8(idx);
                const i16 = view.length - idx >= 2 ? dv.getInt16(idx) : 'EOF';
                const i32 = view.length - idx >= 4 ? dv.getInt32(idx) : 'EOF';
                const i16l = view.length - idx >= 2 ? dv.getInt16(idx, true) : 'EOF';
                const i32l = view.length - idx >= 4 ? dv.getInt32(idx, true) : 'EOF';
                title = `big-endian\nint8=${i8} int16=${i16} int32=${i32}\nlittle-endian\nint16=${i16l} int32=${i32l}`
                bytes += `<div id="${idx}b" data-title="${title}" class="byte">${int.toString(16).padStart(2, '0')}</div>`;
                chars += `<span id="${idx}u" data-title="${title}" class="char">${char}</span>`;
                if ((idx && !((idx + 1) % 16)) || idx === view.length - 1) {
                    temp.innerHTML = `<div id="${(idx - 15).toString(16).padStart(8, '0')}" class="bytes"><div class="part">${bytes}</div>${chars}</div>`;
                    container.append(temp.firstChild);
                    bytes = '';
                    chars = '';
                    continue;
                }
            }
            resolve();
        });

        container.style.display = '';

        document.querySelectorAll('[id$=b]').forEach(el => el.addEventListener('mouseover', ({ target }) => target.parentElement.parentElement.querySelector(`[id = "${parseInt(el.id)}u"]`)?.classList.add('hover')));
        document.querySelectorAll('[id$=b]').forEach(el => el.addEventListener('mouseleave', ({ target }) => target.parentElement.parentElement.querySelector(`[id = "${parseInt(el.id)}u"]`)?.classList.remove('hover')));
        document.querySelectorAll('[id$=u]').forEach(el => el.addEventListener('mouseover', ({ target }) => target.parentElement.querySelector(`[id = "${parseInt(el.id)}b"]`)?.classList.add('hover')));
        document.querySelectorAll('[id$=u]').forEach(el => el.addEventListener('mouseleave', ({ target }) => target.parentElement.querySelector(`[id = "${parseInt(el.id)}b"]`)?.classList.remove('hover')));

        document.querySelectorAll('[id$=b]').forEach(el => el.addEventListener('click', ({ target }) => {
            const value = prompt();
            const offset = parseInt(target.id)
            // dv.setUint8(offset, parseInt(value, 16));
            dv.setInt16(offset, value, true);
            a.download = file.name;
            a.href = URL.createObjectURL(new File([buffer], file.name));
        }));

    }
});
```

```
const input = document.createElement('input');
input.type = 'file';
document.body.append(input);

const a = document.createElement('a');
a.innerText = 'скачать';
document.body.append(a);

input.addEventListener('input', async (event) => {
    const file = input.files[0];
    if (file instanceof File) {
        const buffer = await file.arrayBuff
        const view = new Uint8Array(buffer)
        const dv = new DataView(buffer);
        const container = document.createEl
        container.classList.add('container'
        container.style.display = 'none';
        document.body.append(container);

        await new Promise(resolve => {
            let bytes = '';
            let chars = '';
            let int = '';
            const temp = document.createElement('div');

            for (let
                int
                char
                cons
                cons
                cons
                cons
                cons
                titl
                byte
                char
                if (

                }
            }
            resolve();
        });

        container.style.display = '';

        document.querySelectorAll('[id$=b]').forEach(el => el.addEventListener('mouseover', ({ target }) => target.parentElement.parentElement.querySelector(`[id = "${parseInt(el.id)}u"]`)?.classList.add('hover')));
        document.querySelectorAll('[id$=b]').forEach(el => el.addEventListener('mouseleave', ({ target }) => target.parentElement.parentElement.querySelector(`[id = "${parseInt(el.id)}u"]`)?.classList.remove('hover')));
        document.querySelectorAll('[id$=u]').forEach(el => el.addEventListener('mouseover', ({ target }) => target.parentElement.querySelector(`[id = "${parseInt(el.id)}b"]`)?.classList.add('hover')));
        document.querySelectorAll('[id$=u]').forEach(el => el.addEventListener('mouseleave', ({ target }) => target.parentElement.querySelector(`[id = "${parseInt(el.id)}b"]`)?.classList.remove('hover')));

        document.querySelectorAll('[id$=b]').forEac
            const value = prompt();
            const offset = parseInt(target.id)
            // dv.setUint8(offset, parseInt(value,
            dv.setInt16(offset, value, true);
            a.download = file.name;
            a.href = URL.createObjectURL(new File([
        }));

    }
});
```

```
const dv = new DataView(buffer);
```

```
const i8 = dv.getInt8(idx);
const i16 = view.length - idx >= 2 ? dv.getInt16(idx) : 'EOF';
const i32 = view.length - idx >= 4 ? dv.getInt32(idx) : 'EOF';
const i16l = view.length - idx >= 2 ? dv.getInt16(idx, true) : 'EOF';
const i32l = view.length - idx >= 4 ? dv.getInt32(idx, true) : 'EOF';
```

```
dv.setUint8(offset, parseInt(value, 16));
dv.setInt16(offset, value, true);
```

```
const input = document.createElement('input');
input.type = 'file';
document.body.append(input);

const a = document.createElement('a');
a.innerText = 'скачать';
document.body.append(a);

input.addEventListener('input', async (event) => {
    const file = input.files[0];
    if (file instanceof File) {
        const buffer = await file.arrayBuffer();
        const view = new Uint8Array(buffer);
        const dv = new DataView(buffer);
        const container = document.createElement('div');
        container.classList.add('container');
        container.style.display = 'none';
        document.body.append(container);

        await new Promise(resolve => {
            let bytes = '';
            let chars = '';
            let int = '';
            const temp = document.createElement('div');

            for (let idx = 0; idx <= view.length - 1; idx++) {
                int = view[idx];
                char = String.fromCharCode(int).replace(/\W/gm, '.');
                const i8 = dv.getInt8(idx);
                const i16 = view.length - idx >= 2 ? dv.getInt16(idx) : 'EOF';
                const i32 = view.length - idx >= 4 ? dv.getInt32(idx) : 'EOF';
                const i16l = view.length - idx >= 2 ? dv.getInt16(idx, true) : 'EOF';
                                                       2=${i32l}`
                                                       , '0')}</div>`;
                if ((idx && !((idx + 1) % 16)) || idx === view.length - 1) {
                    temp.innerHTML = `<div id="${(idx - 15).toString(16).padStart(8, '0')}" class="bytes"><div class="part">${bytes}</div>${chars}</div>`;
                    container.append(temp.firstChild);
                    bytes = '';
                    chars = '';
                    continue;
                }
            }
            resolve();
        });

        container.style.display = '';

        document.querySelectorAll('[id$=b]').forEach(el => el.addEventListener('mouseover', ({ target }) => target.parent
        document.querySelectorAll('[id$=b]').forEach(el => el.addEventListener('mouseleave', ({ target }) => target.paren
        document.querySelectorAll('[id$=u]').forEach(el => el.addEventListener('mouseover', ({ target }) => target.parent
        document.querySelectorAll('[id$=u]').forEach(el => el.addEventListener('mouseleave', ({ target }) => target.paren

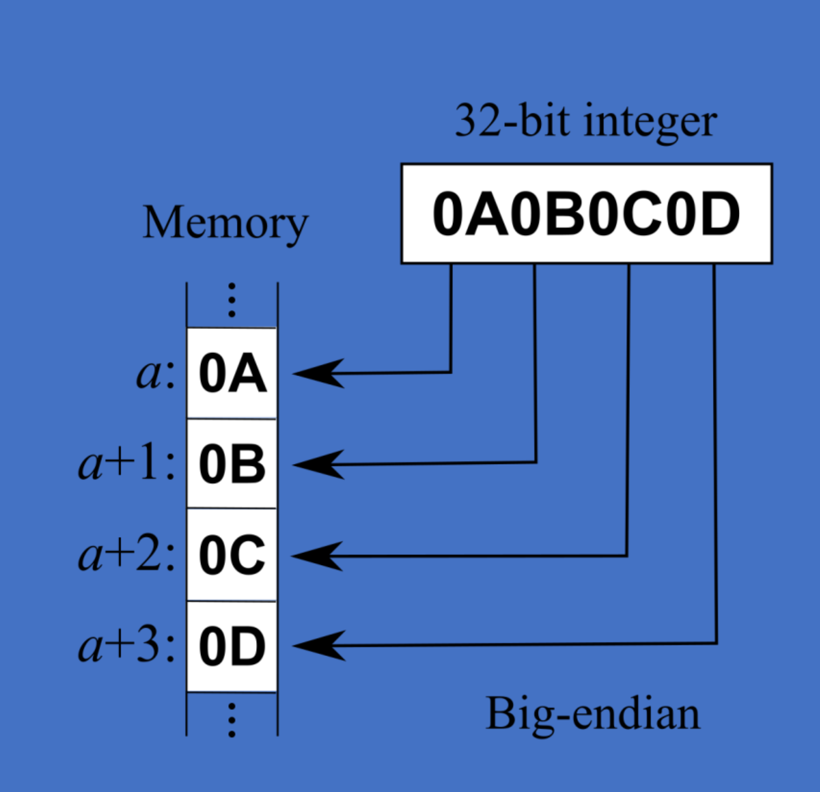
        document.querySelectorAll('[id$=b]').forEach(el => el.addEventListener('click', ({ target }) => {
            const value = prompt();
            const offset = parseInt(target.id)
            // dv.setUint8(offset, parseInt(value, 16));
            dv.setInt16(offset, value, true);
            a.download = file.name;
            a.href = URL.createObjectURL(new File([buffer], file.name));
        }));

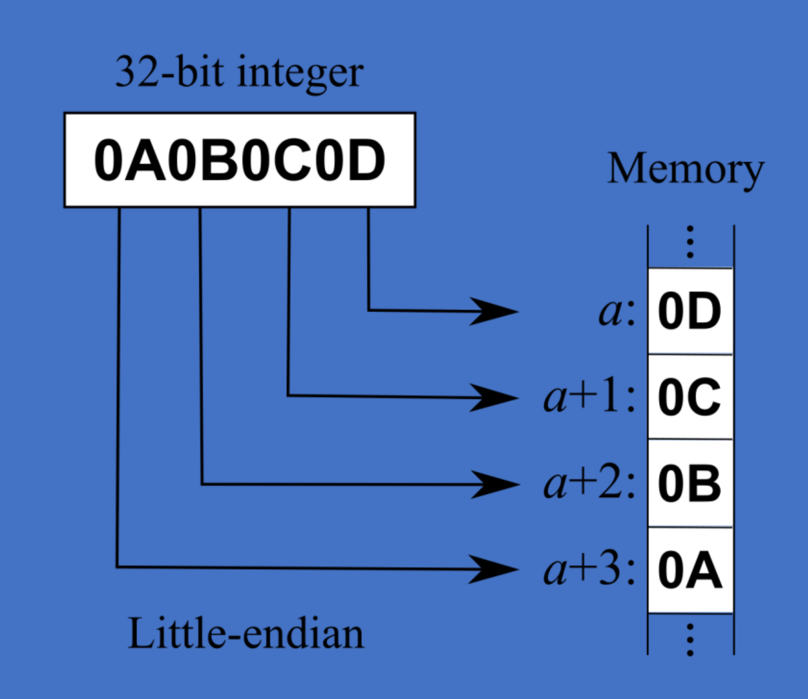
    }
});
```

```
getInt8(offset)
getInt16(offset)
getInt32(offset)
getInt16(offset, littleEndian)
getInt32(offset, littleEndian)
```

```
DataView()
```

```
setInt8(offset, value)
setInt16(offset, value)
setInt32(offset, value)
setInt16(offset, value, littleEndian)
setInt32(offset, value, littleEndian)
```


32-bit integer
0A0B0C0D
Memory
a: 0A
a+1: 0B
a+2: 0C
a+3: 0D
Big-endian


32-bit integer
0A0B0C0D
Memory
a: 0D
a+1: 0C
a+2: 0B
a+3: 0A
Little-endian

Пример

ZIP

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000000	50	4b	03	04	14	00	00	00	08	00	5a	15	4c	55	a2	c7	PK.......ZLU..
00000010	35	95	e6	00	00	00	5f	01	00	00	0a	00	00	00	69	6e	5....._.......in
00000020	64	65	78	2e	68	74	6d	6c	55	90	b1	4e	03	31	0c	86	dex.htmlU..N.1..
00000030	77	24	de	21	78	26	3d	d8	18	92	93	50	5b	24	26	18	w$.!x&=...P[$&
00000040	5a	09	c6	34	71	7b	46	b9	e4	48	dc	2b	7d	7b	72	81	Z..4q{F..H.+}{r.
00000050	56	6d	16	c7	f6	ff	fd	b2	ad	ee	16	6f	f3	d5	e7	fb	Vm.......o....
00000060	52	74	dc	fb	f6	f6	46	4d	51	78	13	76	1a	30	40	ad	Rt....FMQx.v0@.
00000070	a0	71	25	8a	f2	54	8f	6c	84	ed	4c	ca	c8	1a	d6	ab	.q%..T.l..L....
00000080	17	f9	04	97	bd	62	c3	83	c4	ef	3d	8d	1a	3e	e4	fa	....b....=.>..
00000090	59	ce	63	3f	18	a6	8d	47	10	36	06	c6	50	c0	d7	a5	Y.c?..G.6..P...
000000a0	46	b7	c3	6b	34	98	1e	35	8c	84	87	21	26	be	50	1f	F..k4.5...!&.P
000000b0	c8	71	a7	1d	8e	64	51	d6	e4	5e	50	20	26	e3	65	b6	.q..dQ..^P &.e.
000000c0	c6	a3	7e	9c	3d	9c	bd	98	d8	63	bb	88	76	df	17	5a	..~.=....c..v.Z
000000d0	35	35	3f	35	b3	4d	34	b0	c8	c9	6a	a0	e0	f0	67	f6	55?5.M4...j...g.
000000e0	95	41	98	7c	0c	56	38	dc	6e	31	b5	aa	f9	13	4d	ab	.A.|.V8.n1....M.
000000f0	37	ff	bb	ab	4d	74	c7	93	87	a3	51	90	d3	30	cd	67	7...Mt....Q..0.g
00000100	28	60	82	c2	94	62	05	26	61	fd	d4	7b	fe	02	50	4b	(`...b.&a..{..PK
00000110	03	04	14	00	00	00	08	00	a0	a3	4c	55	54	6f	b7	e4	.........LUTo..
00000120	16	02	00	00	8f	04	00	00	08	00	00	00	69	6e	64	65	...........inde
00000130	78	2e	6a	73	75	93	5d	6f	da	30	14	86	ef	91	f8	0f	x.jsu.]o.0.....

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000000	50	4b	03	04	14	00	00	00	08	00	5a	15	4c	55	a2	c7	PK.......ZLU..
00000010	35	95	e6	00	00	00	5f	01	00	00	0a	00	00	00	69	6e	5....._.......in
00000020	64	65	78	2e	68	74	6d	6c	55	90	b1	4e	03	31	0c	86	dex.htmlU..N.1..
00000030	77	24	de												26	18	w$.!x&=...P[$&
00000040	5a	09	c6												72	81	Z..4q{F..H.+}{r.
00000050	56	6d	16												e7	fb	Vm.......o....
00000060	52	74	dc												40	ad	Rt....FMQx.v0@.
00000070	a0	71	25												d6	ab	.q%..T.l..L....
00000080	17	f9	04												e4	fa	....b....=.>..
00000090	59	ce	63												d7	a5	Y.c?..G.6..P...
000000a0	46	b7	c3												50	1f	F..k4.5...!&.P
000000b0	c8	71	a7												65	b6	.q..dQ..^P &.e.
000000c0	c6	a3	7e												17	5a	..~.=....c..v.Z
000000d0	35	35	3f												67	f6	55?5.M4...j...g.
000000e0	95	41	98	7c	0c	56	38	dc	6e	31	b5	aa	f9	13	4d	ab	.A.|.V8.n1....M.
000000f0	37	ff	bb	ab	4d	74	c7	93	87	a3	51	90	d3	30	cd	67	7...Mt....Q..0.g
00000100	28	60	82	c2	94	62	05	26	61	fd	d4	7b	fe	02	50	4b	(`...b.&a..{..PK
00000110	03	04	14	00	00	00	08	00	a0	a3	4c	55	54	6f	b7	e4	.........LUTo..
00000120	16	02	00	00	8f	04	00	00	08	00	00	00	69	6e	64	65	...........inde
00000130	78	2e	6a	73	75	93	5d	6f	da	30	14	86	ef	91	f8	0f	x.jsu.]o.0.....

0	4	Маркер заголовка 0x04034b50 (PK♥♦)
4	2	Минимальная версия для распаковки
6	2	Флаг общего назначения
8	2	Метод сжатия “без сжатия” = 0, DEFLATE = 8
10	2	Время последнего изменения
12	2	Дата последнего изменения
14	4	CRC-32 контрольная сумма не сжатых данных
18	4	Сжатый размер
22	4	Не сжатый размер
26	2	Длина имени файла (*n*)
28	2	Длина дополнительного поля (*m*)
30	*n*	Имя файла
30+*n*	*m*	Дополнительное поле

```
address   00 01 02 03 04 05 06 07  08 09 10 11 12 13 14 15   ASCII
00000000  50 4b 03 04 14 00 00 00  08 00 5a 15 4c 55 a2 c7   PK......ZLU..
00000010  35 95 e6 00 00 00 5f 01  00 00 0a 00 00 00 69 6e   5....._.......in
00000020  64 65 78 2e 68 74 6d 6c  55 90 b1 4e 03 31 0c 86   dex.htmlU..N.1..
00000030  77 24 de                       24 26 18            w$.!x&=...P[$&
00000040  5a 09 c6                       7b 72 81            Z..4q{F..H.+}{r.
00000050  56 6d 16                       15 e7 fb            Vm........o....
00000060  52 74 dc                       30 40 ad            Rt....FMQx.v0@.
00000070  a0 71 25                       1a d6 ab            .q%..T.l..L....
00000080  17 f9 04                       3e e4 fa            ....b....=.>..
00000090  59 ce 63                       c0 d7 a5            Y.c?..G.6..P...
000000a0  46 b7 c3                       be 50 1f            F..k4.5...!&.P
000000b0  c8 71 a7                       e3 65 b6            .q..dQ..^P &.e.
000000c0  c6 a3 7e                       1f 17 5a            ..~.=....c..v.Z
000000d0  35 35 3f                       f0 67 f6            55?5.M4...j...g.
000000e0  95 41 98 7c 0c 56 38 dc  6e 31 b5 aa f9 13 4d ab   .A.|.V8.n1....M.
000000f0  37 ff bb ab 4d 74 c7 93  87 a3 51 90 d3 30 cd 67   7...Mt....Q..0.g
00000100  28 60 82 c2 94 62 05 26  61 fd d4 7b fe 02 50 4b   (`...b.&a..{..PK
00000110  03 04 14 00 00 00 08 00  a0 a3 4c 55 54 6f b7 e4   .........LUTo..
00000120  16 02 00 00 8f 04 00 00  08 00 00 00 69 6e 64 65   ...........inde
00000130  78 2e 6a 73 75 93 5d 6f  da 30 14 86 ef 91 f8 0f   x.jsu.]o.0.....
```

0	4	Маркер заголовка 0x04034b50 (PK♥♦)
4	2	Минимальная версия для распаковки
6	2	Флаг общего назначения
8	2	Метод сжатия “без сжатия” = 0, DEFLATE = 8
10	2	Время последнего изменения
12	2	Дата последнего изменения
14	4	CRC-32 контрольная сумма не сжатых данных
18	4	Сжатый размер
22	4	Не сжатый размер
26	2	Длина имени файла (*n*)
28	2	Длина дополнительного поля (*m*)
30	*n*	Имя файла
30+*n*	*m*	Дополнительное поле

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000000	50	4b	03	04	14	00	00	00	08	00	5a	15	4c	55	a2	c7	PK.......ZLU..
00000010	35	95	e6	00	00	00	5f	01	00	00	0a	00	00	00	69	6e	5....._.......in
00000020	64	65	78	2e	68	74	6d	6c	55	90	b1	4e	03	31	0c	86	dex.htmlU..N.1..
00000030	77	24	de											24	26	18	w$.!x&=...P[$&
00000040	5a	09	c6											7b	72	81	Z..4q{F..H.+}{r.
00000050	56	6d	16											15	e7	fb	Vm.......o....
00000060	52	74	dc											30	40	ad	Rt....FMQx.v0@.
00000070	a0	71	25											1a	d6	ab	.q%..T.l..L....
00000080	17	f9	04											3e	e4	fa	....b....=.>..
00000090	59	ce	63											c0	d7	a5	Y.c?..G.6..P...
000000a0	46	b7	c3											be	50	1f	F..k4.5...!&.P
000000b0	c8	71	a7											e3	65	b6	.q..dQ..^P &.e.
000000c0	c6	a3	7e											1f	17	5a	..~.=....c..v.Z
000000d0	35	35	3f											f0	67	f6	55?5.M4...j...g.
000000e0	95	41	98	7c	0c	56	38	dc	6e	31	b5	aa	f9	13	4d	ab	.A.|.V8.n1....M.
000000f0	37	ff	bb	ab	4d	74	c7	93	87	a3	51	90	d3	30	cd	67	7...Mt....Q..0.g
00000100	28	60	82	c2	94	62	05	26	61	fd	d4	7b	fe	02	50	4b	(`...b.&a..{..PK
00000110	03	04	14	00	00	00	08	00	a0	a3	4c	55	54	6f	b7	e4	.........LUTo..
00000120	16	02	00	00	8f	04	00	00	08	00	00	00	69	6e	64	65	...........inde
00000130	78	2e	6a	73	75	93	5d	6f	da	30	14	86	ef	91	f8	0f	x.jsu.]o.0.....

0	4	Маркер заголовка 0x04034b50 (PK♥♦)
4	2	Минимальная версия для распаковки
6	2	Флаг общего назначения
8	2	Метод сжатия “без сжатия” = 0, DEFLATE = 8
10	2	Время последнего изменения
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14	4	CRC-32 контрольная сумма не сжатых данных
18	4	Сжатый размер
22	4	Не сжатый размер
26	2	Длина имени файла (*n*)
28	2	Длина дополнительного поля (*m*)
30	*n*	Имя файла
30+*n*	*m*	Дополнительное поле

```
address   00 01 02 03 04 05 06 07  08 09 10 11 12 13 14 15   ASCII
00000000  50 4b 03 04 14 00 00 00  08 00 5a 15 4c 55 a2 c7   PK......ZLU..
00000010  35 95 e6 00 00 00 5f 01  00 00 0a 00 00 00 69 6e   5....._.......in
00000020  64 65 78 2e 68 74 6d 6c  55 90 b1 4e 03 31 0c 86   dex.htmlU..N.1..
00000030  77 24 de                             24 26 18   w$.!x&=...P[$&
00000040  5a 09 c6                             7b 72 81   Z..4q{F..H.+}{r.
00000050  56 6d 16                             15 e7 fb   Vm........o....
00000060  52 74 dc                             30 40 ad   Rt....FMQx.v0@.
00000070  a0 71 25                             1a d6 ab   .q%..T.l..L....
00000080  17 f9 04                             3e e4 fa   ....b....=.>..
00000090  59 ce 63                             c0 d7 a5   Y.c?..G.6..P...
000000a0  46 b7 c3                             be 50 1f   F..k4.5...!&.P
000000b0  c8 71 a7                             e3 65 b6   .q..dQ..^P &.e.
000000c0  c6 a3 7e                             1f 17 5a   ..~.=....c..v.Z
000000d0  35 35 3f                             f0 67 f6   55?5.M4...j...g.
000000e0  95 41 98 7c 0c 56 38 dc  6e 31 b5 aa f9 13 4d ab   .A.|.V8.n1....M.
000000f0  37 ff bb ab 4d 74 c7 93  87 a3 51 90 d3 30 cd 67   7...Mt....Q..0.g
00000100  28 60 82 c2 94 62 05 26  61 fd d4 7b fe 02 50 4b   (`...b.&a..{..PK
00000110  03 04 14 00 00 00 08 00  a0 a3 4c 55 54 6f b7 e4   .........LUTo..
00000120  16 02 00 00 8f 04 00 00  08 00 00 00 69 6e 64 65   ............inde
00000130  78 2e 6a 73 75 93 5d 6f  da 30 14 86 ef 91 f8 0f   x.jsu.]o.0.....
```

0	4	Маркер заголовка 0x04034b50 (PK♥♦)
4	2	Минимальная версия для распаковки
6	2	Флаг общего назначения
8	2	Метод сжатия “без сжатия” = 0, DEFLATE = 8
10	2	Время последнего изменения
12	2	Дата последнего изменения
14	4	CRC-32 контрольная сумма не сжатых данных
18	4	Сжатый размер
22	4	Не сжатый размер
26	2	Длина имени файла (*n*)
28	2	Длина дополнительного поля (*m*)
30	*n*	Имя файла
30+*n*	*m*	Дополнительное поле

```
address   00 01 02 03 04 05 06 07  08 09 10 11 12 13 14 15   ASCII
00000000  50 4b 03 04 14 00 00 00  08 00 5a 15 4c 55 a2 c7   PK......ZLU..
00000010  35 95 e6 00 00 00 5f 01  00 00 0a 00 00 00 69 6e   5....._........in
00000020  64 65 78 2e 68 74 6d 6c  55 90 b1 4e 03 31 0c 86   dex.htmlU..N.1..
00000030  77 24 de ...                         24 26 18   w$.!x&=...P[$&
00000040  5a 09 c6 ...                         7b 72 81   Z..4q{F..H.+}{r.
00000050  56 6d 16 ...                         15 e7 fb   Vm.......o....
00000060  52 74 dc ...                         30 40 ad   Rt....FMQx.v0@.
00000070  a0 71 25 ...                         1a d6 ab   .q%..T.l..L....
00000080  17 f9 04 ...                         3e e4 fa   ....b....=.>..
00000090  59 ce 63 ...                         c0 d7 a5   Y.c?..G.6..P...
000000a0  46 b7 c3 ...                         be 50 1f   F..k4.5...!&.P
000000b0  c8 71 a7 ...                         e3 65 b6   .q..dQ..^P &.e.
000000c0  c6 a3 7e ...                         1f 17 5a   ..~.=....c..v.Z
000000d0  35 35 3f ...                         f0 67 f6   55?5.M4...j...g.
000000e0  95 41 98 7c 0c 56 38 dc  6e 31 b5 aa f9 13 4d ab   .A.|.V8.n1....M.
000000f0  37 ff bb ab 4d 74 c7 93  87 a3 51 90 d3 30 cd 67   7...Mt....Q..0.g
00000100  28 60 82 c2 94 62 05 26  61 fd d4 7b fe 02 50 4b   (`...b.&a..{..PK
00000110  03 04 14 00 00 00 08 00  a0 a3 4c 55 54 6f b7 e4   .........LUTo..
00000120  16 02 00 00 8f 04 00 00  08 00 00 00 69 6e 64 65   ............inde
00000130  78 2e 6a 73 75 93 5d 6f  da 30 14 86 ef 91 f8 0f   x.jsu.]o.0.....
```

0	4	Маркер заголовка 0x04034b50 (PK♥♦)
4	2	Минимальная версия для распаковки
6	2	Флаг общего назначения
8	2	Метод сжатия “без сжатия” = 0, DEFLATE = 8
10	2	Время последнего изменения
12	2	Дата последнего изменения
14	4	CRC-32 контрольная сумма не сжатых данных
18	4	Сжатый размер
22	4	Не сжатый размер
26	2	Длина имени файла (*n*)
28	2	Длина дополнительного поля (*m*)
30	*n*	Имя файла
30+*n*	*m*	Дополнительное поле

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000000	50	4b	03	04	14	00	00	00	08	00	5a	15	4c	55	a2	c7	PK........ZLU..
00000010	35	95	e6	00	00	00	5f	01	00	00	0a	00	00	00	69	6e	5....._.......in
00000020	64	65	78	2e	68	74	6d	6c	55	90	b1	4e	03	31	0c	86	dex.htmlU..N.1..
00000030	77	24	de											24	26	18	w$.!x&=...P[$&
00000040	5a	09	c6											7b	72	81	Z..4q{F..H.+}{r.
00000050	56	6d	16											15	e7	fb	Vm.......o....
00000060	52	74	dc											30	40	ad	Rt....FMQx.v0@.
00000070	a0	71	25											1a	d6	ab	.q%..T.l..L....
00000080	17	f9	04											3e	e4	fa	....b....=.>..
00000090	59	ce	63											c0	d7	a5	Y.c?..G.6..P...
000000a0	46	b7	c3											be	50	1f	F..k4.5...!&.P
000000b0	c8	71	a7											e3	65	b6	.q..dQ..^P &.e.
000000c0	c6	a3	7e											df	17	5a	..~.=....c..v.Z
000000d0	35	35	3f											f0	67	f6	55?5.M4...j...g.
000000e0	95	41	98	7c	0c	56	38	dc	6e	31	b5	aa	f9	13	4d	ab	.A.|.V8.n1....M.
000000f0	37	ff	bb	ab	4d	74	c7	93	87	a3	51	90	d3	30	cd	67	7...Mt....Q..0.g
00000100	28	60	82	c2	94	62	05	26	61	fd	d4	7b	fe	02	50	4b	(`...b.&a..{..PK
00000110	03	04	14	00	00	00	08	00	a0	a3	4c	55	54	6f	b7	e4	..........LUTo..
00000120	16	02	00	00	8f	04	00	00	08	00	00	00	69	6e	64	65	............inde
00000130	78	2e	6a	73	75	93	5d	6f	da	30	14	86	ef	91	f8	0f	x.jsu.]o.0.....

0	4	Маркер загаловка 0x04034b50 (PK♥♦)
4	2	Минимальная версия для распаковки
6	2	Флаг общего назначения
8	2	Метод сжатия “без сжатия” = 0, DEFLATE = 8
10	2	Время последнего изменения
12	2	Дата последнего изменения
14	4	CRC-32 контрольная сумма не сжатых данных
18	4	Сжатый размер
22	4	Не сжатый размер
26	2	Длина имени файла (*n*)
28	2	Длина дополнительного поля (*m*)
30	*n*	Имя файла
30+*n*	*m*	Дополнительное поле

```
address   00 01 02 03 04 05 06 07  08 09 10 11 12 13 14 15   ASCII
00000000  50 4b 03 04 14 00 00 00  08 00 5a 15 4c 55 a2 c7   PK.......ZLU..
00000010  35 95 e6 00 00 00 5f 01  00 00 0a 00 00 00 69 6e   5....._.......in
00000020  64 65 78 2e 68 74 6d 6c  55 90 b1 4e 03 31 0c 86   dex.htmlU..N.1..
00000030  77 24 de                          24 26 18   w$.!x&=...P[$&
00000040  5a 09 c6                          7b 72 81   Z..4q{F..H.+}{r.
00000050  56 6d 16                          15 e7 fb   Vm.......o....
00000060  52 74 dc                          30 40 ad   Rt....FMQx.v0@.
00000070  a0 71 25                          1a d6 ab   .q%..T.l..L....
00000080  17 f9 04                          3e e4 fa   ....b....=.>..
00000090  59 ce 63                          c0 d7 a5   Y.c?..G.6..P...
000000a0  46 b7 c3                          be 50 1f   F..k4.5...!&.P
000000b0  c8 71 a7                          e3 65 b6   .q..dQ..^P &.e.
000000c0  c6 a3 7e                          1f 17 5a   ..~.=....c..v.Z
000000d0  35 35 3f                          f0 67 f6   55?5.M4...j...g.
000000e0  95 41 98 7c 0c 56 38 dc  6e 31 b5 aa f9 13 4d ab   .A.|.V8.n1....M.
000000f0  37 ff bb ab 4d 74 c7 93  87 a3 51 90 d3 30 cd 67   7...Mt....Q..0.g
00000100  28 60 82 c2 94 62 05 26  61 fd d4 7b fe 02 50 4b   (`...b.&a..{..PK
00000110  03 04 14 00 00 00 08 00  a0 a3 4c 55 54 6f b7 e4   .........LUTo..
00000120  16 02 00 00 8f 04 00 00  08 00 00 00 69 6e 64 65   ...........inde
00000130  78 2e 6a 73 75 93 5d 6f  da 30 14 86 ef 91 f8 0f   x.jsu.]o.0.....
```

0	4	Маркер заголовка 0x04034b50 (PK♥♦)
4	2	Минимальная версия для распаковки
6	2	Флаг общего назначения
8	2	Метод сжатия “без сжатия” = 0, DEFLATE = 8
10	2	Время последнего изменения
12	2	Дата последнего изменения
14	4	CRC-32 контрольная сумма не сжатых данных
18	4	Сжатый размер
22	4	Не сжатый размер
26	2	Длина имени файла (*n*)
28	2	Длина дополнительного поля (*m*)
30	*n*	Имя файла
30+*n*	*m*	Дополнительное поле

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000000	50	4b	03	04	14	00	00	00	08	00	5a	15	4c	55	a2	c7	PK.......ZLU..
00000010	35	95	e6	00	00	00	5f	01	00	00	0a	00	00	00	69	6e	5....._.......in
00000020	64	65	78	2e	68	74	6d	6c	55	90	b1	4e	03	31	0c	86	dex.htmlU..N.1..
00000030	77	24	de											24	26	18	w$.!x&=...P[$&
00000040	5a	09	c6											b	72	81	Z..4q{F..H.+}{r.
00000050	56	6d	16											15	e7	fb	Vm.......o....
00000060	52	74	dc											0	40	ad	Rt....FMQx.v0@.
00000070	a0	71	25											a	d6	ab	.q%..T.l..L....
00000080	17	f9	04											e	e4	fa	....b....=.>..
00000090	59	ce	63											0	d7	a5	Y.c?..G.6..P...
000000a0	46	b7	c3											e	50	1f	F..k4.5...!&.P
000000b0	c8	71	a7											3	65	b6	.q..dQ..^P &.e.
000000c0	c6	a3	7e											f	17	5a	..~.=....c..v.Z
000000d0	35	35	3f											0	67	f6	55?5.M4...j...g.
000000e0	95	41	98	7c	0c	56	38	dc	6e	31	b5	aa	f9	13	4d	ab	.A.|.V8.n1....M.
000000f0	37	ff	bb	ab	4d	74	c7	93	87	a3	51	90	d3	30	cd	67	7...Mt....Q..0.g
00000100	28	60	82	c2	94	62	05	26	61	fd	d4	7b	fe	02	50	4b	(`...b.&a..{..PK
00000110	03	04	14	00	00	00	08	00	a0	a3	4c	55	54	6f	b7	e4	.........LUTo..
00000120	16	02	00	00	8f	04	00	00	08	00	00	00	69	6e	64	65	...........inde
00000130	78	2e	6a	73	75	93	5d	6f	da	30	14	86	ef	91	f8	0f	x.jsu.]o.0.....

0	4	Маркер заголовка 0x04034b50 (PK♥♦)
4	2	Минимальная версия для распаковки
6	2	Флаг общего назначения
8	2	Метод сжатия “без сжатия” = 0, DEFLATE = 8
10	2	Время последнего изменения
12	2	Дата последнего изменения
14	4	CRC-32 контрольная сумма не сжатых данных
18	4	Сжатый размер
22	4	Не сжатый размер
26	2	Длина имени файла (*n*)
28	2	Длина дополнительного поля (*m*)
30	*n*	Имя файла
30+*n*	*m*	Дополнительное поле

```
address   00 01 02 03 04 05 06 07  08 09 10 11 12 13 14 15   ASCII
00000000  50 4b 03 04 14 00 00 00  08 00 5a 15 4c 55 a2 c7   PK.......ZLU..
00000010  35 95 e6 00 00 00 5f 01  00 00 0a 00 00 00 69 6e   5....._.......in
00000020  64 65 78 2e 68 74 6d 6c  55 90 b1 4e 03 31 0c 86   dex.htmlU..N.1..
00000030  77 24 de                           4 26 18   w$.!x&=...P[$&
00000040  5a 09 c6                           b 72 81   Z..4q{F..H.+}{r.
00000050  56 6d 16                           5 e7 fb   Vm.......o....
00000060  52 74 dc                           0 40 ad   Rt....FMQx.v0@.
00000070  a0 71 25                           a d6 ab   .q%..T.l..L....
00000080  17 f9 04                           e e4 fa   ....b....=.>..
00000090  59 ce 63                           0 d7 a5   Y.c?..G.6..P...
000000a0  46 b7 c3                           e 50 1f   F..k4.5...!&.P
000000b0  c8 71 a7                           3 65 b6   .q..dQ..^P &.e.
000000c0  c6 a3 7e                           f 17 5a   ..~.=....c..v.Z
000000d0  35 35 3f                           0 67 f6   55?5.M4...j...g.
000000e0  95 41 98 7c 0c 56 38 dc  6e 31 b5 aa f9 13 4d ab   .A.|.V8.n1....M.
000000f0  37 ff bb ab 4d 74 c7 93  87 a3 51 90 d3 30 cd 67   7...Mt....Q..0.g
00000100  28 60 82 c2 94 62 05 26  61 fd d4 7b fe 02 50 4b   (`...b.&a..{..PK
00000110  03 04 14 00 00 00 08 00  a0 a3 4c 55 54 6f b7 e4   .........LUTo..
00000120  16 02 00 00 8f 04 00 00  08 00 00 00 69 6e 64 65   ............inde
00000130  78 2e 6a 73 75 93 5d 6f  da 30 14 86 ef 91 f8 0f   x.jsu.]o.0.....
```

0	4	Маркер заголовка 0x04034b50 (PK♥♦)
4	2	Минимальная версия для распаковки
6	2	Флаг общего назначения
8	2	Метод сжатия “без сжатия” = 0, DEFLATE = 8
10	2	Время последнего изменения
12	2	Дата последнего изменения
14	4	CRC-32 контрольная сумма не сжатых данных
18	4	Сжатый размер
22	4	Не сжатый размер
26	2	Длина имени файла (*n*)
28	2	Длина дополнительного поля (*m*)
30	*n*	Имя файла
30+*n*	*m*	Дополнительное поле

```
address   00 01 02 03 04 05 06 07  08 09 10 11 12 13 14 15   ASCII
00000000  50 4b 03 04 14 00 00 00  08 00 5a 15 4c 55 a2 c7   PK.......ZLU..
00000010  35 95 e6 00 00 00 5f 01  00 00 0a 00 00 00 69 6e   5....._.......in
00000020  64 65 78 2e 68 74 6d 6c  55 90 b1 4e 03 31 0c 86   dex.htmlU..N.1..
00000030  77 24 de                                  26 18    w$.!x&=...P[$&
00000040  5a 09 c6                                  72 81    Z..4q{F..H.+}{r.
00000050  56 6d 16                                  e7 fb    Vm.......o....
00000060  52 74 dc                                  40 ad    Rt....FMQx.v0@.
00000070  a0 71 25                                  d6 ab    .q%..T.l..L....
00000080  17 f9 04                                  e4 fa    ....b....=.>..
00000090  59 ce 63                                  d7 a5    Y.c?..G.6..P...
000000a0  46 b7 c3                                  50 1f    F..k4.5...!&.P
000000b0  c8 71 a7                                  65 b6    .q..dQ..^P &.e.
000000c0  c6 a3 7e                                  17 5a    ..~.=....c..v.Z
000000d0  35 35 3f                                  67 f6    55?5.M4...j...g.
000000e0  95 41 98 7c 0c 56 38 dc  6e 31 b5 aa f9 13 4d ab   .A.|.V8.n1....M.
000000f0  37 ff bb ab 4d 74 c7 93  87 a3 51 90 d3 30 cd 67   7...Mt.....Q..0.g
00000100  28 60 82 c2 94 62 05 26  61 fd d4 7b fe 02 50 4b   (`...b.&a..{..PK
00000110  03 04 14 00 00 00 08 00  a0 a3 4c 55 54 6f b7 e4   .........LUTo..
00000120  16 02 00 00 8f 04 00 00  08 00 00 00 69 6e 64 65   ............inde
00000130  78 2e 6a 73 75 93 5d 6f  da 30 14 86 ef 91 f8 0f   x.jsu.]o.0.....
```

0	4	Маркер заголовка 0x04034b50 (PK♥♦)
4	2	Минимальная версия для распаковки
6	2	Флаг общего назначения
8	2	Метод сжатия “без сжатия” = 0, DEFLATE = 8
10	2	Время последнего изменения
12	2	Дата последнего изменения
14	4	CRC-32 контрольная сумма не сжатых данных
18	4	Сжатый размер
22	4	Не сжатый размер
26	2	Длина имени файла (*n*)
28	2	Длина дополнительного поля (*m*)
30	*n*	Имя файла
30+*n*	*m*	Дополнительное поле

```
address   00 01 02 03 04 05 06 07  08 09 10 11 12 13 14 15   ASCII
00000000  50 4b 03 04 14 00 00 00  08 00 5a 15 4c 55 a2 c7   PK......ZLU..
00000010  35 95 e6 00 00 00 5f 01  00 00 0a 00 00 00 69 6e   5......_.......in
00000020  64 65 78 2e 68 74 6d 6c  55 90 b1 4e 03 31 0c 86   dex.htmlU..N.1..
00000030  77 24 de                             24 26 18   w$.!x&=...P[$&
00000040  5a 09 c6                             7b 72 81   Z..4q{F..H.+}{r.
00000050  56 6d 16                             15 e7 fb   Vm.......o....
00000060  52 74 dc                             30 40 ad   Rt....FMQx.v0@.
00000070  a0 71 25                             1a d6 ab   .q%..T.l..L....
00000080  17 f9 04                             3e e4 fa   ....b....=.>..
00000090  59 ce 63                             c0 d7 a5   Y.c?..G.6..P...
000000a0  46 b7 c3                             be 50 1f   F..k4.5...!&.P
000000b0  c8 71 a7                             e3 65 b6   .q..dQ..^P &.e.
000000c0  c6 a3 7e                             1f 17 5a   ..~.=....c..v.Z
000000d0  35 35 3f                             f0 67 f6   55?5.M4...j...g.
000000e0  95 41 98 7c 0c 56 38 dc  6e 31 b5 aa f9 13 4d ab   .A.|.V8.n1....M.
000000f0  37 ff bb ab 4d 74 c7 93  87 a3 51 90 d3 30 cd 67   7...Mt....Q..0.g
00000100  28 60 82 c2 94 62 05 26  61 fd d4 7b fe 02 50 4b   (`...b.&a..{..PK
00000110  03 04 14 00 00 00 08 00  a0 a3 4c 55 54 6f b7 e4   .........LUTo..
00000120  16 02 00 00 8f 04 00 00  08 00 00 00 69 6e 64 65   ............inde
00000130  78 2e 6a 73 75 93 5d 6f  da 30 14 86 ef 91 f8 0f   x.jsu.]o.0.....
```

0	4	Маркер заголовка 0x04034b50 (PK♥♦)
4	2	Минимальная версия для распаковки
6	2	Флаг общего назначения
8	2	Метод сжатия “без сжатия” = 0, DEFLATE = 8
10	2	Время последнего изменения
12	2	Дата последнего изменения
14	4	CRC-32 контрольная сумма не сжатых данных
18	4	Сжатый размер
22	4	Не сжатый размер
26	2	Длина имени файла (*n*)
28	2	Длина дополнительного поля (*m*)
30	*n*	Имя файла
30+*n*	*m*	Дополнительное поле

```
address   00 01 02 03 04 05 06 07  08 09 10 11 12 13 14 15   ASCII
00000000  50 4b 03 04 14 00 00 00  08 00 5a 15 4c 55 a2 c7   PK......ZLU..
00000010  35 95 e6 00 00 00 5f 01  00 00 0a 00 00 00 69 6e   5....._.......in
00000020  64 65 78 2e 68 74 6d 6c  55 90 b1 4e 03 31 0c 86   dex.htmlU..N.1..
00000030  77 24 de                             24 26 18   w$.!x&=...P[$&
00000040  5a 09 c6                             7b 72 81   Z..4q{F..H.+}{r.
00000050  56 6d 16                             15 e7 fb   Vm.......o....
00000060  52 74 dc                             30 40 ad   Rt....FMQx.v0@.
00000070  a0 71 25                             1a d6 ab   .q%..T.l..L....
00000080  17 f9 04                             3e e4 fa   ....b....=.>..
00000090  59 ce 63                             c0 d7 a5   Y.c?..G.6..P...
000000a0  46 b7 c3                             be 50 1f   F..k4.5...!&.P
000000b0  c8 71 a7                             e3 65 b6   .q..dQ..^P &.e.
000000c0  c6 a3 7e                             1f 17 5a   ..~.=....c..v.Z
000000d0  35 35 3f                             f0 67 f6   55?5.M4...j...g.
000000e0  95 41 98 7c 0c 56 38 dc  6e 31 b5 aa f9 13 4d ab   .A.|.V8.n1....M.
000000f0  37 ff bb ab 4d 74 c7 93  87 a3 51 90 d3 30 cd 67   7...Mt....Q..0.g
00000100  28 60 82 c2 94 62 05 26  61 fd d4 7b fe 02 50 4b   (`...b.&a..{..PK
00000110  03 04 14 00 00 00 08 00  a0 a3 4c 55 54 6f b7 e4   .........LUTo..
00000120  16 02 00 00 8f 04 00 00  08 00 00 00 69 6e 64 65   ............inde
00000130  78 2e 6a 73 75 93 5d 6f  da 30 14 86 ef 91 f8 0f   x.jsu.]o.0.....
```

0	4	Маркер заголовка 0x04034b50 (PK♥♦)
4	2	Минимальная версия для распаковки
6	2	Флаг общего назначения
8	2	Метод сжатия “без сжатия” = 0, DEFLATE = 8
10	2	Время последнего изменения
12	2	Дата последнего изменения
14	4	CRC-32 контрольная сумма не сжатых данных
18	4	Сжатый размер
22	4	Не сжатый размер
26	2	Длина имени файла (*n*)
28	2	Длина дополнительного поля (*m*)
30	*n*	Имя файла
30+*n*	*m*	Дополнительное поле

Local file header

```
address   00 01 02 03 04 05 06 07  08 09 10 11 12 13 14 15   ASCII
00000000  50 4b 03 04 14 00 00 00  08 00 5a 15 4c 55 a2 c7   PK......ZLU..
00000010  35 95 e6 00 00 00 5f 01  00 00 0a 00 00 00 69 6e   5....._.......in
00000020  64 65 78 2e 68 74 6d 6c  55 90 b1 4e 03 31 0c 86   dex.htmlU..N.1..
00000030  77 24 de 21 78 26 3d d8  18 92 93 50 5b 24 26 18   w$.!x&=...P[$&
00000040  5a 09 c6 34 71 7b 46 b9  e4 48 dc 2b 7d 7b 72 81   Z..4q{F..H.+}{r.
00000050  56 6d 16 c7 f6 ff fd b2  ad ee 16 6f f3 d5 e7 fb   Vm.......o....
00000060  52 74 dc fb f6 f6 46 4d  51 78 13 76 1a 30 40 ad   Rt....FMQx.v0@.
00000070  a0 71 25 8a f2 54 8f 6c  84 ed 4c ca c8 1a d6 ab   .q%..T.l..L....
00000080  17 f9 04                                           ....=.>..
00000090  59 ce 63                                           .G.6..P...
000000a0  46 b7 c3                                           .5...!&.P
000000b0  c8 71 a7 1d 8e 64 51 d6  e4 5e 50 20 26 e3 65 b6   .q..dQ..^P &.e.
000000c0  c6 a3 7e 9c 3d 9c bd 98  d8 63 bb 88 76 df 17 5a   ..~.=....c..v.Z
000000d0  35 35 3f 35 b3 4d 34 b0  c8 c9 6a a0 e0 f0 67 f6   55?5.M4...j...g.
000000e0  95 41 98 7c 0c 56 38 dc  6e 31 b5 aa f9 13 4d ab   .A.|.V8.n1....M.
000000f0  37 ff bb ab 4d 74 c7 93  87 a3 51 90 d3 30 cd 67   7...Mt....Q..0.g
00000100  28 60 82 c2 94 62 05 26  61 fd d4 7b fe 02 50 4b   (`...b.&a..{..PK
00000110  03 04 14 00 00 00 08 00  a0 a3 4c 55 54 6f b7 e4   .........LUTo..
00000120  16 02 00 00 8f 04 00 00  08 00 00 00 69 6e 64 65   ...........inde
00000130  78 2e 6a 73 75 93 5d 6f  da 30 14 86 ef 91 f8 0f   x.jsu.]o.0.....
```

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000000	50	4b	03	04	14	00	00	00	08	00	5a	15	4c	55	a2	c7	PK.......ZLU..
00000010	35	95	e6	00	00	00	5f	01	00	00	0a	00	00	00	69	6e	5....._.......in
00000020	64	65	78	2e	68	74	6d	6c	55	90	b1	4e	03	31	0c	86	dex.htmlU..N.1..
00000030	77	24	de	21	78	26	3d	d8	18	92	93	50	5b	24	26	18	w$.!x&=...P[$&
00000040	5a	09	c6	34	71	7b	46	b9	e4	48	dc	2b	7d	7b	72	81	Z..4q{F..H.+}{r.
00000050	56	6d	16	c7	f6	ff	fd	b2	ad	ee	16	6f	f3	d5	e7	fb	Vm.......o....
00000060	52	74	dc	fb	f6	f6	46	4d	51	78	13	76	1a	30	40	ad	Rt....FMQx.v0@.
00000070	a0	71	25	8a	f2	54	8f	6c	84	ed	4c	ca	c8	1a	d6	ab	.q%..T.l..L....
00000080	17	f9	04	97	bd	62	c3	83	c4	ef	3d	8d	1a	3e	e4	fa	....b....=.>..
00000090	59	ce	63	3f	18	a6	8d	47	10	36	06	c6	50	c0	d7	a5	Y.c?..G.6..P...
000000a0	46	b7	c3	6b	34	98	1e	35	8c	84	87	21	26	be	50	1f	F..k4.5...!&.P
000000b0	c8	71	a7	1d	8e	64	51	d6	e4	5e	50	20	26	e3	65	b6	.q..dQ..^P &.e.
000000c0	c6	a3	7e	9c	3d	9c	bd	98	d8	63	bb	88	76	df	17	5a	..~.=....c..v.Z
000000d0	35	35	3f	35	b3	4d	34	b0	c8	c9	6a	a0	e0	f0	67	f6	55?5.M4...j...g.
000000e0	95	41	98	7c	0c	56	38	dc	6e	31	b5	aa	f9	13	4d	ab	.A.|.V8.n1....M.
000000f0	37	ff	bb	ab	4d	74	c7	93	87	a3	51	90	d3	30	cd	67	7...Mt....Q..0.g
00000100	28	60	82	c2	94	62	05	26	61	fd	d4	7b	fe	02	50	4b	(`...b.&a..{..PK
00000110	03	04	14	00	00	00	08	00	a0	a3	4c	55	54	6f	b7	e4	.........LUTo..
00000120	16	02	00	00	8f	04	00	00	08	00	00	00	69	6e	64	65	...........inde
00000130	78	2e	6a	73	75	93	5d	6f	da	30	14	86	ef	91	f8	0f	x.jsu.]o.0.....

```
address   00 01 02 03 04 05 06 07  08 09 10 11 12 13 14 15   ASCII
00000340  ef 79 1f 6a fb bd 56 c4  7f 01 50 4b 01 02 3f 00   .yj..V.□.PK..?.
00000350  14 00 00 00 08 00 5a 15  4c 55 a2 c7 35 95 e6 00   .....ZLU..5...
00000360  00 00 5f 01 00 00 0a 00  24 00 00 00 00 00 00 00   .._.....$.......
00000370  20 00 00 00 00 00 00 00  69 6e 64 65 78 2e 68 74   .......index.ht
00000380  6d 6c 0a 00 20 00 00 00  00 00 01 00 18 00 10 6e   ml.. .........n
00000390  18 2d cb dd d8 01 32 fe  1a 5f 60 de d8 01 2b b8   -....2._`...+.
000003a0  6c 9d ca dd d8 01 50 4b  01 02 3f 00 14 00 00 00   l.....PK..?....
000003b0  08 00 a0 a3 4c 55 54 6f  b7 e4 16 02 00 00 8f 04   ....LUTo.......
000003c0  00 00 08 00 24 00 00 00  00 00 00 00 20 00 00 00   ....$....... ...
000003d0  0e 01 00 00 69 6e 64 65  78 2e 6a 73 0a 00 20 00   ....index.js.. .
000003e0  00 00 00 00 01 00 18 00  55 96 0e 1d 60 de d8 01   ........U..`...
000003f0  36 a6 98 40 60 de d8 01  a2 1f 2f b1 ca dd d8 01   6..@`..../.....
00000400  50 4b 05 06 00 00 00 00  02 00 02 00 b6 00 00 00   PK..............
00000410  4a 03 00 00 00 00                                  J.....
```

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000340	ef	79	1f	6a	fb	bd	56	c4	7f	01	50	4b	01	02	3f	00	.yj..V.□.PK..?.
00000350	14	00	00	00	08	00	5a	15	4c	55	a2	c7	35	95	e6	00	.....ZLU..5...
00000360	00	00	5f	01	00	00	0a	00	24	00	00	00	00	00	00	00	.._.....$.......
00000370	20	00	00	00	00	00	00	00	69	6e	64	65	78	2e	68	74	.......index.ht
00000380	6d	6c	0a	00	20	00	00	00	00	00	01	00	18	00	10	6e	ml.. ....n
00000390	18	2d	cb	dd	d8	01	32	fe	1a	5f	60	de	d8	01	2b	b8	-....2._`...+.
000003a0	6c	9d	ca	dd	d8	01	50	4b	01	02	3f	00	14	00	00	00	l.....PK..?....
000003b0	08	00	a0	a3	4c	55	54	6f	b7	e4	16	02	00	00	8f	04	....LUTo.......
000003c0	00	00	08	00	24	00	00	00	00	00	00	00	20	00	00	00	....$....... ...
000003d0	0e	01	00	00	69	6e	64	65	78	2e	6a	73	0a	00	20	00	....index.js.. .
000003e0	00	00	00	00	01	00	18	00	55	96	0e	1d	60	de	d8	01	.......U..`...
000003f0	36	a6	98	40	60	de	d8	01	a2	1f	2f	b1	ca	dd	d8	01	6..@`..../.....
00000400	50	4b	05	06	00	00	00	00	02	00	02	00	b6	00	00	00	PK..............
00000410	4a	03	00	00	00	00											J.....

Central directory file header

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000340	ef	79	1f	6a	fb	bd	56	c4	7f	01	50	4b	01	02	3f	00	.yj..V.□.PK..?.
00000350	14	00	00	00	08	00	5a	15	4c	55	a2	c7	35	95	e6	00	
00000360	00	00	5f	01	00	00	0a	00	24	00	00	00	00	00	00	00	
00000370	20	00	00	00	00	00	00	00	69	6e	64	65	78	2e	68	74	
00000380	6d	6c	0a	00	20	00	00	00	00	00	01	00	18	00	10	6e	ml.. ....n
00000390	18	2d	cb	dd	d8	01	32	fe	1a	5f	60	de	d8	01	2b	b8	-....2._`...+.
000003a0	6c	9d	ca	dd	d8	01	50	4b	01	02	3f	00	14	00	00	00	l.....PK..?....
000003b0	08	00	a0	a3	4c	55	54	6f	b7	e4	16	02	00	00	8f	04	....LUTo.......
000003c0	00	00	08	00	24	00	00	00	00	00	00	00	20	00	00	00	....$....... ...
000003d0	0e	01	00	00	69	6e	64	65	78	2e	6a	73	0a	00	20	00	....index.js.. .
000003e0	00	00	00	00	01	00	18	00	55	96	0e	1d	60	de	d8	01	.......U..`...
000003f0	36	a6	98	40	60	de	d8	01	a2	1f	2f	b1	ca	dd	d8	01	6..@`..../.....
00000400	50	4b	05	06	00	00	00	00	02	00	02	00	b6	00	00	00	PK..............
00000410	4a	03	00	00	00	00											J.....

Имя файла

Central directory file header

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000340	ef	79	1f	6a	fb	bd	56	c4	7f	01	50	4b	01	02	3f	00	.yj..V.□.PK..?.
00000350	14	00	00	00	08	00	5a	15	4c	55	a2	c7	35	95	e6	00	
00000360	00	00	5f	01	00	00	0a	00	24	00	00	00	00	00	00	00	
00000370	20	00	00	00	00	00	00	00	69	6e	64	65	78	2e	68	74	
00000380	6d	6c	0a	00	20	00	00	00	00	00	01	00	18	00	10	6e	ml.. ....n
00000390	18	2d	cb	dd	d8	01	32	fe	1a	5f	60	de	d8	01	2b	b8	-....2._`...+.
000003a0	6c	9d	ca	dd	d8	01	50	4b	01	02	3f	00	14	00	00	00	l.....PK..?....
000003b0	08	00	a0	a3	4c	55	54	6f	b7	e4	16	02	00	00	8f	04	....LUTo.......
000003c0	00	00	08	00	24	00	00	00	00	00	00	00	20	00	00	00	....$....... ...
000003d0	0e	01	00	00	69	6e	64	65	78	2e	6a	73	0a	00	20	00	....index.js.. .
000003e0	00	00	00	00	01	00	18	00	55	96	0e	1d	60	de	d8	01	.......U..`...
000003f0	36	a6	98	40	60	de	d8	01	a2	1f	2f	b1	ca	dd	d8	01	6..@`..../.....
00000400	50	4b	05	06	00	00	00	00	02	00	02	00	b6	00	00	00	PK..............
00000410	4a	03	00	00	00	00											J.....

Сжатый размер
Не сжатый размер

Central directory file header

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000340	ef	79	1f	6a	fb	bd	56	c4	7f	01	50	4b	01	02	3f	00	.yj..V.□.PK..?.
00000350	14	00	00	00	08	00	5a	15	4c	55	a2	c7	35	95	e6	00	
00000360	00	00	5f	01	00	00	0a	00	24	00	00	00	00	00	00	00	
00000370	20	00	00	00	00	00	00	00	69	6e	64	65	78	2e	68	74	
00000380	6d	6c	0a	00	20	00	00	00	00	00	01	00	18	00	10	6e	ml.. ....n
00000390	18	2d	cb	dd	d8	01	32	fe	1a	5f	60	de	d8	01	2b	b8	-....2._`...+.
000003a0	6c	9d	ca	dd	d8	01	50	4b	01	02	3f	00	14	00	00	00	l.....PK..?....
000003b0	08	00	a0	a3	4c	55	54	6f	b7	e4	16	02	00	00	8f	04	....LUTo.......
000003c0	00	00	08	00	24	00	00	00	00	00	00	00	20	00	00	00	....$....... ...
000003d0	0e	01	00	00	69	6e	64	65	78	2e	6a	73	0a	00	20	00	....index.js.. .
000003e0	00	00	00	00	01	00	18	00	55	96	0e	1d	60	de	d8	01	.......U..`...
000003f0	36	a6	98	40	60	de	d8	01	a2	1f	2f	b1	ca	dd	d8	01	6..@`..../.....
00000400	50	4b	05	06	00	00	00	00	02	00	02	00	b6	00	00	00	PK..............
00000410	4a	03	00	00	00	00											J.....

Число CDF
Размер всех CDF
Начало CDF

End of central directory record

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000340	ef	79	1f	6a	fb	bd	56	c4	7f	01	50	4b	01	02	3f	00	.yj..V.▯.PK..?.
00000350	14	00	00	00	08	00	5a	15	4c	55	a2	c7	35	95	e6	00	
00000360	00	00	5f	01	00	00	0a	00	24	00	00	00	00	00	00	00	
00000370	20	00	00	00	00	00	00	00	69	6e	64	65	78	2e	68	74	
00000380	6d	6c	0a	00	20	00	00	00	00	00	01	00	18	00	10	6e	ml.. ....n
00000390	18	2d	cb	dd	d8	01	32	fe	1a	5f	60	de	d8	01	2b	b8	-....2._`...+.
000003a0	6c	9d	ca	dd	d8	01	50	4b	01	02	3f	00	14	00	00	00	l.....PK..?....
000003b0	08	00	a0	a3	4c	55	54	6f	b7	e4	16	02	00	00	8f	04	....LUTo.......
000003c0	00	00	08	00	24	00	00	00	00	00	00	00	20	00	00	00	....$....... ...
000003d0	0e	01	00	00	69	6e	64	65	78	2e	6a	73	0a	00	20	00	....index.js.. .
000003e0	00	00	00	00	01	00	18	00	55	96	0e	1d	60	de	d8	01	........U..`...
000003f0	36	a6	98	40	60	de	d8	01	a2	1f	2f	b1	ca	dd	d8	01	6..@`..../.....
00000400	50	4b	05	06	00	00	00	00	02	00	02	00	b6	00	00	00	PK..............
00000410	4a	03	00	00	00	00											J.....

Число CDF
Размер всех CDF
Начало CDF

4a 03 00 00 -> 00 00 03 4A

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000340	ef	79	1f	6a	fb	bd	56	c4	7f	01	50	4b	01	02	3f	00	.yj..V.□.PK..?.
00000350	14	00	00	00	08	00	5a	15	4c	55	a2	c7	35	95	e6	00	
00000360	00	00	5f	01	00	00	0a	00	24	00	00	00	00	00	00	00	
00000370	20	00	00	00	00	00	00	00	69	6e	64	65	78	2e	68	74	
00000380	6d	6c	0a	00	20	00	00	00	00	00	01	00	18	00	10	6e	ml.. ....n
00000390	18	2d	cb	dd	d8	01	32	fe	1a	5f	60	de	d8	01	2b	b8	-....2._`...+.
000003a0	6c	9d	ca	dd	d8	01	50	4b	01	02	3f	00	14	00	00	00	l.....PK..?....
000003b0	08	00	a0	a3	4c	55	54	6f	b7	e4	16	02	00	00	8f	04	....LUTo.......
000003c0	00	00	08	00	24	00	00	00	00	00	00	00	20	00	00	00	....$....... ...
000003d0	0e	01	00	00	69	6e	64	65	78	2e	6a	73	0a	00	20	00	....index.js.. .
000003e0	00	00	00	00	01	00	18	00	55	96	0e	1d	60	de	d8	01	.......U..`...
000003f0	36	a6	98	40	60	de	d8	01	a2	1f	2f	b1	ca	dd	d8	01	6..@`..../.....
00000400	50	4b	05	06	00	00	00	00	02	00	02	00	b6	00	00	00	PK.............
00000410	4a	03	00	00	00	00											J.....

Число CDF
Размер всех CDF
Начало CDF

parseInt('0000034A', 16) = 842

address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	ASCII
00000340	ef	79	1f	6a	fb	bd	56	c4	7f	01	50	4b	01	02	3f	00	.yj..V.□.PK..?.
00000350	14	00	00	00	08	00	5a	15	4c	55	a2	c7	35	95	e6	00	.....ZLU..5...
00000360	00	00	5f	01	00	00	0a	00	24	00	00	00	00	00	00	00	.._.....$.......
00000370	20	00	00	00	00	00	00	00	69	6e	64	65	78	2e	68	74	.......index.ht
00000380	6d	6c	0a	00	20	00	00	00	00	00	01	00	18	00	10	6e	ml.. ....n
00000390	18	2d	cb	dd	d8	01	32	fe	1a	5f	60	de	d8	01	2b	b8	-....2._`...+.
000003a0	6c	9d	ca	dd	d8	01	50	4b	01	02	3f	00	14	00	00	00	l.....PK..?....
000003b0	08	00	a0	a3	4c	55	54	6f	b7	e4	16	02	00	00	8f	04	....LUTo.......
000003c0	00	00	08	00	24	00	00	00	00	00	00	00	20	00	00	00	....$....... ...
000003d0	0e	01	00	00	69	6e	64	65	78	2e	6a	73	0a	00	20	00	....index.js.. .
000003e0	00	00	00	00	01	00	18	00	55	96	0e	1d	60	de	d8	01	.......U..`...
000003f0	36	a6	98	40	60	de	d8	01	a2	1f	2f	b1	ca	dd	d8	01	6..@`..../.....
00000400	50	4b	05	06	00	00	00	00	02	00	02	00	b6	00	00	00	PK..............
00000410	4a	03	00	00	00	00											J.....

parseInt('00000340', 16) + 10 = 842

Пример

```javascript
const input = document.createElement('input');
input.setAttribute('type', 'file');
input.setAttribute('accept', '.zip');
document.body.appendChild(input);

const pre = document.createElement('pre');
document.body.appendChild(pre);

input.onchange = async (e) => {
    const buffer = await e.target.files[0].arrayBuffer();
    const view = new DataView(buffer);
    let offset = 0;

    const signature = view.getUint32(0, true);
    if (signature !== 0x04034b50) {
        throw Error('Не ZIP архив или ошибки в заголовке.');
    }

    let result = '';

    while (view.getUint32(offset, true) === 0x04034b50) {
        const compressedSize = view.getUint32(offset + 18, true);
        const uncompressedSize = view.getUint32(offset + 22, true);
        const filenameLength = view.getUint16(offset + 26, true);
        const extraFieldLength = view.getUint16(offset + 28, true);
        const fileName = new Uint8Array(buffer, offset + 30, filenameLength);
        const decoder = new TextDecoder();
        const fileNameUTF8 = decoder.decode(fileName);
        offset += 30 + filenameLength + extraFieldLength + compressedSize;
        result += fileNameUTF8 + `(${compressedSize}:${uncompressedSize})` + '\n\n';
    }

    pre.innerText = result;
}
```

```
while (view.getUint32(offset, true) === 0x04034b50) {
    const compressedSize = view.getUint32(offset + 18, true);
    const uncompressedSize = view.getUint32(offset + 22, true);
    const filenameLength = view.getUint16(offset + 26, true);
    const extraFieldLength = view.getUint16(offset + 28, true);
    const fileName = new Uint8Array(buffer, offset + 30, filenameLength);
    const decoder = new TextDecoder();
    const fileNameUTF8 = decoder.decode(fileName);
    offset += 30 + filenameLength + extraFieldLength + compressedSize;
    result += fileNameUTF8 + `(${compressedSize}:${uncompressedSize})` + '\n\n';
}
```

```
while (view.getUint32(offset, true) === 0x04034b50) {
    const compressedSize = view.getUint32(offset + 18, true);
    const uncompressedSize = view.getUint32(offset + 22, true);
    const filenameLength = view.getUint16(offset + 26, true);
    const extraFieldLength = view.getUint16(offset + 28, true);
    const fileName = new Uint8Array(buffer, offset + 30, filenameLength);
    const decoder = new TextDecoder();
    const fileNameUTF8 = decoder.decode(fileName);
    offset += 30 + filenameLength + extraFieldLength + compressedSize;
    result += fileNameUTF8 + `(${compressedSize}:${uncompressedSize})` + '\n\n';
}
```

```
0xN - 16
0oN - 8
0bN - 2
```

```
while (view.getUint32(offset, true) === 0x04034b50) {
    const compressedSize = view.getUint32(offset + 18, true);
    const uncompressedSize = view.getUint32(offset + 22, true);
    const filenameLength = view.getUint16(offset + 26, true);
    const extraFieldLength = view.getUint16(offset + 28, true);
    const fileName = new Uint8Array(buffer, offset + 30, filenameLength);
    const decoder = new TextDecoder();
    const fileNameUTF8 = decoder.decode(fileName);
    offset += 30 + filenameLength + extraFieldLength + compressedSize;
    result += fileNameUTF8 + `(${compressedSize}:${uncompressedSize})` + '\n\n';
}
```

Пример

```
const zip = async (files, comp = false) => {
    const encoder = new TextEncoder();
    const zipObj = await Object.entries(files).reduce(async (obj, [fileName, data]) => {

        obj = await obj;
        fileName = await fileName;
        data = await data;

        size = data.length;
        _crc32 = crc32(data);
        const offset = obj.lf.length;

        const compressed = await compress(data);
        const compressedSize = compressed.length;

        obj.lf.push(67324752 & 0xff);
        obj.lf.push(67324752 >> 8 & 0xff);
        obj.lf.push(67324752 >> 16 & 0xff);
        obj.lf.push(67324752 >> 24 & 0xff);
        obj.lf.push(10, 0, 0, 0, 8, 0);
        obj.lf.push(28021 & 0xff);
        obj.lf.push(28021 >> 8 & 0xff);
        obj.lf.push(20072 & 0xff);
        obj.lf.push(20072 >> 8 & 0xff);
        obj.lf.push(_crc32 & 0xff);
        obj.lf.push(_crc32 >> 8 & 0xff);
        obj.lf.push(_crc32 >> 16 & 0xff);
        obj.lf.push(_crc32 >> 24 & 0xff);

        obj.lf.push(compressedSize & 0xff);
        obj.lf.push(compressedSize >> 8 & 0xff);
        obj.lf.push(compressedSize >> 16 & 0xff);
        obj.lf.push(compressedSize >> 24 & 0xff);

        obj.lf.push(size & 0xff);
        obj.lf.push(size >> 8 & 0xff);
        obj.lf.push(size >> 16 & 0xff);
        obj.lf.push(size >> 24 & 0xff);
        obj.lf.push(fileName.length & 0xff);
        obj.lf.push(fileName.length >> 8 & 0xff);
        obj.lf.push(0, 0);
        obj.lf.push(...encoder.encode(fileName));

        obj.lf.push(...compressed);

        obj.cd.push(33639248 & 0xff);
        obj.cd.push(33639248 >> 8 & 0xff);
        obj.cd.push(33639248 >> 16 & 0xff);
        obj.cd.push(33639248 >> 24 & 0xff);
        obj.cd.push(0, 0, 0, 0, 0, 0, 0, 0);
        obj.cd.push(28021 & 0xff);
        obj.cd.push(28021 >> 8 & 0xff);
        obj.cd.push(20072 & 0xff);
        obj.cd.push(20072 >> 8 & 0xff);
        obj.cd.push(_crc32 & 0xff);
        obj.cd.push(_crc32 >> 8 & 0xff);
        obj.cd.push(_crc32 >> 16 & 0xff);
        obj.cd.push(_crc32 >> 24 & 0xff);

        obj.cd.push(compressedSize & 0xff);
        obj.cd.push(compressedSize >> 8 & 0xff);
        obj.cd.push(compressedSize >> 16 & 0xff);
        obj.cd.push(compressedSize >> 24 & 0xff);

        obj.cd.push(size & 0xff);
        obj.cd.push(size >> 8 & 0xff);
        obj.cd.push(size >> 16 & 0xff);
        obj.cd.push(size >> 24 & 0xff);
        obj.cd.push(fileName.length & 0xff);
        obj.cd.push(fileName.length >> 8 & 0xff);
        obj.cd.push(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0);
        obj.cd.push(offset & 0xff);
        obj.cd.push(offset >> 8 & 0xff);
        obj.cd.push(offset >> 16 & 0xff);
        obj.cd.push(offset >> 24 & 0xff);
        obj.cd.push(...encoder.encode(fileName));

        obj.ecdf[0] += 1;
        obj.ecdf[1] = obj.cd.length;
        obj.ecdf[2] = obj.lf.length;

        return obj;
    }, {
        lf: [], cd: [], ecdf: [0, 0, 0]
    });

    const ecd = [
        101010256 & 0xff,
        101010256 >> 8 & 0xff,
        101010256 >> 16 & 0xff,
        101010256 >> 24 & 0xff,
        0, 0,
        0, 0,
        zipObj.ecdf[0] & 0xff,
        zipObj.ecdf[0] >> 8 & 0xff,
        zipObj.ecdf[0] & 0xff,
        zipObj.ecdf[0] >> 8 & 0xff,
        zipObj.ecdf[1] & 0xff,
        zipObj.ecdf[1] >> 8 & 0xff,
        zipObj.ecdf[1] >> 16 & 0xff,
        zipObj.ecdf[1] >> 24 & 0xff,
        zipObj.ecdf[2] & 0xff,
        zipObj.ecdf[2] >> 8 & 0xff,
        zipObj.ecdf[2] >> 16 & 0xff,
        zipObj.ecdf[2] >> 24 & 0xff,
        0, 0
    ]

    return new Int8Array([...zipObj.lf, ...zipObj.cd, ...ecd]).buffer
}
```

```
obj.lf.push(67324752 & 0xff);
obj.lf.push(67324752 >> 8 & 0xff);
obj.lf.push(67324752 >> 16 & 0xff);
obj.lf.push(67324752 >> 24 & 0xff);
obj.lf.push(10, 0, 0, 0, 8, 0);
obj.lf.push(28021 & 0xff);
obj.lf.push(28021 >> 8 & 0xff);
obj.lf.push(20072 & 0xff);
obj.lf.push(20072 >> 8 & 0xff);
obj.lf.push(_crc32 & 0xff);
obj.lf.push(_crc32 >> 8 & 0xff);
obj.lf.push(_crc32 >> 16 & 0xff);
obj.lf.push(_crc32 >> 24 & 0xff);
obj.lf.push(compressedSize & 0xff);
obj.lf.push(compressedSize >> 8 & 0xff);
obj.lf.push(compressedSize >> 16 & 0xff);
obj.lf.push(compressedSize >> 24 & 0xff);
obj.lf.push(size & 0xff);
obj.lf.push(size >> 8 & 0xff);
obj.lf.push(size >> 16 & 0xff);
obj.lf.push(size >> 24 & 0xff);
obj.lf.push(fileName.length & 0xff);
obj.lf.push(fileName.length >> 8 & 0xff);
obj.lf.push(0, 0);
obj.lf.push(...encoder.encode(fileName));
obj.lf.push(...compressed);
```

```
obj.cd.push(33639248 & 0xff);
obj.cd.push(33639248 >> 8 & 0xff);
obj.cd.push(33639248 >> 16 & 0xff);
obj.cd.push(33639248 >> 24 & 0xff);
obj.cd.push(0, 0, 0, 0, 0, 0, 0, 0);
obj.cd.push(28021 & 0xff);
obj.cd.push(28021 >> 8 & 0xff);
obj.cd.push(20072 & 0xff);
obj.cd.push(20072 >> 8 & 0xff);
obj.cd.push(_crc32 & 0xff);
obj.cd.push(_crc32 >> 8 & 0xff);
obj.cd.push(_crc32 >> 16 & 0xff);
obj.cd.push(_crc32 >> 24 & 0xff);
obj.cd.push(compressedSize & 0xff);
obj.cd.push(compressedSize >> 8 & 0xff);
obj.cd.push(compressedSize >> 16 & 0xff);
obj.cd.push(compressedSize >> 24 & 0xff);
obj.cd.push(size & 0xff);
obj.cd.push(size >> 8 & 0xff);
obj.cd.push(size >> 16 & 0xff);
obj.cd.push(size >> 24 & 0xff);
obj.cd.push(fileName.length & 0xff);
obj.cd.push(fileName.length >> 8 & 0xff);
obj.cd.push(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0);
obj.cd.push(offset & 0xff);
obj.cd.push(offset >> 8 & 0xff);
obj.cd.push(offset >> 16 & 0xff);
obj.cd.push(offset >> 24 & 0xff);
obj.cd.push(...encoder.encode(fileName));
```

```
obj.lf.push(67324752 & 0xff);
obj.lf.push(67324752 >> 8 & 0xff);
obj.lf.push(67324752 >> 16 & 0xff);
obj.lf.push(67324752 >> 24 & 0xff);
obj.lf.push(10, 0, 0, 0, 8, 0);
obj.lf.push(28021 & 0xff);
obj.lf.push(28021 >> 8 & 0xff);
obj.lf.push(20072 & 0xff);
obj.lf.push(20072 >> 8 & 0xff);
obj.lf.push(_crc32 & 0xff);
obj.lf.push(_crc32 >> 8 & 0xff);
obj.lf.push(_crc32 >> 16 & 0xff);
obj.lf.push(_crc32 >> 24 & 0xff);
obj.lf.push(compressedSize & 0xff);
obj.lf.push(compressedSize >> 8 & 0xff);
obj.lf.push(compressedSize >> 16 & 0xff);
obj.lf.push(compressedSize >> 24 & 0xff);
obj.lf.push(size & 0xff);
obj.lf.push(size >> 8 & 0xff);
obj.lf.push(size >> 16 & 0xff);
obj.lf.push(size >> 24 & 0xff);
obj.lf.push(fileName.length & 0xff);
obj.lf.push(fileName.length >> 8 & 0xff);
obj.lf.push(0, 0);
obj.lf.push(...encoder.encode(fileName));
obj.lf.push(...compressed);
```

```
obj.cd.push(33639248 & 0xff);
obj.cd.push(33639248 >> 8 & 0xff);
obj.cd.push(33639248 >> 16 & 0xff);
obj.cd.push(33639248 >> 24 & 0xff);
obj.cd.push(0, 0, 0, 0, 0, 0, 0, 0);
obj.cd.push(28021 & 0xff);
obj.cd.push(28021 >> 8 & 0xff);
obj.cd.push(20072 & 0xff);
obj.cd.push(20072 >> 8 & 0xff);
obj.cd.push(_crc32 & 0xff);
obj.cd.push(_crc32 >> 8 & 0xff);
obj.cd.push(_crc32 >> 16 & 0xff);
obj.cd.push(_crc32 >> 24 & 0xff);
obj.cd.push(compressedSize & 0xff);
obj.cd.push(compressedSize >> 8 & 0xff);
obj.cd.push(compressedSize >> 16 & 0xff);
obj.cd.push(compressedSize >> 24 & 0xff);
obj.cd.push(size & 0xff);
obj.cd.push(size >> 8 & 0xff);
obj.cd.push(size >> 16 & 0xff);
obj.cd.push(size >> 24 & 0xff);
obj.cd.push(fileName.length & 0xff);
obj.cd.push(fileName.length >> 8 & 0xff);
obj.cd.push(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0);
obj.cd.push(offset & 0xff);
obj.cd.push(offset >> 8 & 0xff);
obj.cd.push(offset >> 16 & 0xff);
obj.cd.push(offset >> 24 & 0xff);
obj.cd.push(...encoder.encode(fileName));
```

```
obj.lf.push(compressedSize & 0xff);
obj.lf.push(compressedSize >> 8 & 0xff);
obj.lf.push(compressedSize >> 16 & 0xff);
obj.lf.push(compressedSize >> 24 & 0xff);
```

```
obj.cd.push(33639248 & 0xff);
obj.cd.push(33639248 >> 8 & 0xff);
obj.cd.push(33639248 >> 16 & 0xff);
obj.cd.push(33639248 >> 24 & 0xff);
```

```
obj.lf.push(compressedSize & 0xff);
obj.lf.push(compressedSize >> 8 & 0xff);
obj.lf.push(compressedSize >> 16 & 0xff);
obj.lf.push(compressedSize >> 24 & 0xff);
```

```
obj.cd.push(33639248 & 0xff);
obj.cd.push(33639248 >> 8 & 0xff);
obj.cd.push(33639248 >> 16 & 0xff);
obj.cd.push(33639248 >> 24 & 0xff);
```

	2	16	ASCII
(33639248).toString(2).padStart(32, '0')	00000010000000010100101101010000		

```
obj.lf.push(compressedSize & 0xff);
obj.lf.push(compressedSize >> 8 & 0xff);
obj.lf.push(compressedSize >> 16 & 0xff);
obj.lf.push(compressedSize >> 24 & 0xff);
```

```
obj.cd.push(33639248 & 0xff);
obj.cd.push(33639248 >> 8 & 0xff);
obj.cd.push(33639248 >> 16 & 0xff);
obj.cd.push(33639248 >> 24 & 0xff);
```

	2	16	ASCII
(33639248).toString(2).padStart(32, '0')	00000010000000010100101101010000		
(0xff).toString(2).padStart(32, '0')	00000000000000000000000011111111		

```
obj.lf.push(compressedSize & 0xff);
obj.lf.push(compressedSize >> 8 & 0xff);
obj.lf.push(compressedSize >> 16 & 0xff);
obj.lf.push(compressedSize >> 24 & 0xff);
```

```
obj.cd.push(33639248 & 0xff);
obj.cd.push(33639248 >> 8 & 0xff);
obj.cd.push(33639248 >> 16 & 0xff);
obj.cd.push(33639248 >> 24 & 0xff);
```

	2	16	ASCII
(33639248).toString(2).padStart(32, '0')	00000010000000010100101101010000		
(0xff).toString(2).padStart(32, '0')	00000000000000000000000011111111		
(33639248 & 0xff).toString(2).padStart(32, '0')	00000000000000000000000001010000	50	P

```
obj.lf.push(compressedSize & 0xff);
obj.lf.push(compressedSize >> 8 & 0xff);
obj.lf.push(compressedSize >> 16 & 0xff);
obj.lf.push(compressedSize >> 24 & 0xff);
```

```
obj.cd.push(33639248 & 0xff);
obj.cd.push(33639248 >> 8 & 0xff);
obj.cd.push(33639248 >> 16 & 0xff);
obj.cd.push(33639248 >> 24 & 0xff);
```

	2	16	ASCII
(33639248).toString(2).padStart(32, '0')	00000010000000010100101101010000		
(0xff).toString(2).padStart(32, '0')	00000000000000000000000011111111		
(33639248 & 0xff).toString(2).padStart(32, '0')	00000000000000000000000001010000	50	P
(33639248 >> 8).toString(2).padStart(32, '0')	00000000000000100000000101001011		
(0xff).toString(2).padStart(32, '0')	00000000000000000000000011111111		
(33639248 >> 8 & 0xff).toString(2).padStart(32, '0')	00000000000000000000000001001011	4b	K

```
obj.lf.push(compressedSize & 0xff);
obj.lf.push(compressedSize >> 8 & 0xff);
obj.lf.push(compressedSize >> 16 & 0xff);
obj.lf.push(compressedSize >> 24 & 0xff);
```

```
obj.cd.push(33639248 & 0xff);
obj.cd.push(33639248 >> 8 & 0xff);
obj.cd.push(33639248 >> 16 & 0xff);
obj.cd.push(33639248 >> 24 & 0xff);
```

	2	16	ASCII
(33639248).toString(2).padStart(32, '0')	00000010000000010100101101010000		
(0xff).toString(2).padStart(32, '0')	00000000000000000000000011111111		
(33639248 & 0xff).toString(2).padStart(32, '0')	00000000000000000000000001010000	50	P
(33639248 >> 8).toString(2).padStart(32, '0')	00000000000000100000000101001011		
(0xff).toString(2).padStart(32, '0')	00000000000000000000000011111111		
(33639248 >> 8 & 0xff).toString(2).padStart(32, '0')	00000000000000000000000001001011	4b	K
(33639248 >> 16 & 0xff).toString(2).padStart(32, '0')	00000000000000000000001000000001	01	
(33639248 >> 24 & 0xff).toString(2).padStart(32, '0')	00000000000000000000000000000010	02	

```
const compress = async (data) => {
    const encoder = new TextEncoder();
    const array = encoder.encode(data);
    const stream = new ReadableStream({
        start(controller) {
            controller.enqueue(array);
            controller.close();
        },
        type: 'bytes'
    });
    const combined = stream.pipeThrough(new CompressionStream('deflate-raw'));
    const reader = combined.getReader();
    let result = null;
    await reader.read().then(function foo({ done, value }) {
        if (done) {
            return;
        }
        result = value;
        return reader.read().then(foo);
    });
    return result;
}
```

```
const compress = async (data) => {
    const encoder = new TextEncoder();
    const array = encoder.encode(data);
    const stream = new ReadableStream({
        start(controller) {
            controller.enqueue(array);
            controller.close();
        },
        type: 'bytes'
    });
    const combined = stream.pipeThrough(new CompressionStream('deflate-raw'));
    const reader = combined.getReader();
    let result = null;
    await reader.read().then(function foo({ done, value }) {
        if (done) {
            return;
        }
        result = value;
        return reader.read().then(foo);
    });
    return result;
}
```

```
fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0-win-x86.zip', {
    headers: {
        'range': `bytes=${21953915 + 30 + 53}-${3529 + 21953915 + 30 + 53}`
    }
})
    .then(resp => resp.blob())
    .then(blob => {
        const ds = new DecompressionStream('deflate-raw');
        const stream = blob.stream().pipeThrough(ds);
        const reader = stream.getReader();
        reader.read().then(({ done, value }) => {
            const decoder = new TextDecoder();
            const file = new File([decoder.decode(value)], 'README.md');
            const url = URL.createObjectURL(file);

            const a = document.createElement('a');
            a.download = 'README.md';
            a.href = url;
            document.body.append(a);
            a.click();
        });
    })
```

```
fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0-win-x86.zip', {
    headers: {
        'range': `bytes=${21953915 + 30 + 53}-${3529 + 21953915 + 30 + 53}`
    }
})
    .then(resp => resp.blob())
    .then(blob => {
        const ds = new DecompressionStream('deflate-raw');
        const stream = blob.stream().pipeThrough(ds);
        const reader = stream.getReader();
        reader.read().then(({ done, value }) => {
            const decoder = new TextDecoder();
            const file = new File([decoder.decode(value)], 'README.md');
            const url = URL.createObjectURL(file);

            const a = document.createElement('a');
            a.download = 'README.md';
            a.href = url;
            document.body.append(a);
            a.click();
        });
    })
```

Бонус пример №1

```javascript
fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0-win-x86.zip', {
    headers: {
        'range': 'bytes=-22'
    }
})
    .then(resp => resp.blob())
    .then(blob => blob.arrayBuffer())
    .then(buffer => {
        const dataView = new DataView(buffer);
        const sign = dataView.getUint32(0, true);
        const filesCount = dataView.getUint16(10, true);
        const cdStartOffset = dataView.getUint32(16, true);
        console.log(sign, sign.toString(16), filesCount, cdStartOffset);

        fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0-win-x86.zip', {
            headers: {
                'range': `bytes=${cdStartOffset}-`
            }
        })
            .then(resp => resp.blob())
            .then(blob => blob.arrayBuffer())
            .then(buffer => {
                let offset = 0;
                let result = '';
                const dataView = new DataView(buffer);
                console.log(buffer, dataView.getUint32(offset, true));
                while (dataView.getUint32(offset, true) === 33639248) {
                    const compressedSize = dataView.getUint32(offset + 20, true);
                    const uncompressedSize = dataView.getUint32(offset + 24, true);
                    const filenameLength = dataView.getUint16(offset + 28, true);
                    const extraFieldLength = dataView.getUint16(offset + 30, true);
                    const fileCommentLength = dataView.getUint16(offset + 32, true);
                    const fileName = new Uint8Array(buffer, offset + 46, filenameLength);
                    const decoder = new TextDecoder();
                    const fileNameUTF8 = decoder.decode(fileName);
                    offset += 46 + filenameLength + extraFieldLength + fileCommentLength;
                    result += fileNameUTF8 + `(${compressedSize}:${uncompressedSize})` + '\n\n';
                }
                console.log(result);
            });
    });
```

```
fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0-win-x86.zip', {
    headers: {
        'range': 'bytes=-22'
    }
})
    .then(resp => resp.blob())
    .then(blob => blob.arrayBuffer())
    .then(buffer => {
        const dataView = new DataView(buffer);
        const sign = dataView.getUint32(0, true);
        const filesCount = dataView.getUint16(10, true);
        const cdStartOffset = dataView.getUint32(16, true);
        console.log(sign, sign.toString(16), filesCount, cdStartOffset);

        fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0-win-x86.zip', {
            headers: {
                'range': `bytes=${cdStartOffset}-`
            }
        })
            .then(resp => resp.blob())
            .then(blob => blob.arrayBuffer())
            .then(buffer => {
                let offset = 0;
                let result = '';
                const dataView = new DataView(buffer);
                console.log(buffer, dataView.getUint32(offset, true));
                while (dataView.getUint32(offset, true) === 33639248) {
                    const compressedSize = dataView.getUint32(offset + 20, true);
                    const uncompressedSize = dataView.getUint32(offset + 24, true);
                    const filenameLength = dataView.getUint16(offset + 28, true);
                    const extraFieldLength = dataView.getUint16(offset + 30, true);
                    const fileCommentLength = dataView.getUint16(offset + 32, true);
                    const fileName = new Uint8Array(buffer, offset + 46, filenameLength);
                    const decoder = new TextDecoder();
                    const fileNameUTF8 = decoder.decode(fileName);
                    offset += 46 + filenameLength + extraFieldLength + fileCommentLength;
                    result += fileNameUTF8 + `(${compressedSize}:${uncompressedSize})` + '\n\n';
                }
                console.log(result);
            });
    });
```

```
fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0-win-x86.zip', {
    headers: {
        'range': 'bytes=-22'
    }
})
    .then(resp => resp.blob())
    .then(blob => blob.arrayBuffer())
    .then(buffer => {
        const dataView = new DataView(buffer);
        const sign = dataView.getUint32(0, true);
        const filesCount = dataView.getUint16(10, true);
        const cdStartOffset = dataView.getUint32(16, true);
        console.log(sign, sign.toString(16), filesCount, cdStartOffset);

        fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0-win-x86.zip', {
            headers: {
                'range': `bytes=${cdStartOffset}-`
            }
        })
});
```

```
fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0-win-x86.zip', {
    headers: {
        'range': 'bytes=-22'
    }
})
    .then(resp => resp.blob())
    .then(blob => blob.arrayBuffer())
    .then(buffer => {
        const dataView = new DataView(buffer);
        const sign = dataView.getUint32(0, true);
        const filesCount = dataView.getUint16(10, true);
        const cdStartOffset = dataView.getUint32(16, true);
        console.log(sign, sign.toString(16), filesCount, cdStartOffset);

        fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0-win-x86.zip', {
            headers: {
                'range': `bytes=${cdStartOffset}-`
            }
        })
});
```

```
fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0
    headers: {
        'range': 'bytes=-22'
    }
})
    .then(resp => resp.blob())
    .then(blob => blob.arrayBuffer())
    .then(buffer => {
        const dataView = new DataView(buffer);
        const sign = dataView.getUint32(0, true);
        const filesCount = dataView.getUint16(10, true);
        const cdStartOffset = dataView.getUint32(16, true);
        console.log(sign, sign.toString(16), filesCount, cdStartOffset);

        fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0-win-x86.zip', {
            headers: {
                'range': `bytes=${cdStartOffset}-`
            }
        })
});
```

EOCD		
0	4	Маркер
4	2	Число дисков
6	2	Диск на котором расположена CD
8	2	Число CD на диске
10	2	Число CD
12	4	Размер CD
16	4	Смещение до первой записи CD
20	2	Длина комментария
22	n	Комментарий

```
fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0
    headers: {
        'range': 'bytes=-22'
    }
})
    .then(resp => resp.blob())
    .then(blob => blob.arrayBuffer())
    .then(buffer => {
        const dataView = new DataView(buffer);
        const sign = dataView.getUint32(0, true);
        const filesCount = dataView.getUint16(10, true);
        const cdStartOffset = dataView.getUint32(16, true);
        console.log(sign, sign.toString(16), filesCount, cdStartOffset);

        fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0-win-x86.zip', {
            headers: {
                'range': `bytes=${cdStartOffset}-`
            }
        })
});
```

EOCD		
0	4	Маркер
4	2	Число дисков
6	2	Диск на котором расположена CD
8	2	Число CD на диске
10	2	Число CD
12	4	Размер CD
16	4	Смещение до первой записи CD
20	2	Длина комментария
22	n	Комментарий

```
fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0
    headers: {
        'range': 'bytes=-22'
    }
})
    .then(resp => resp.blob())
    .then(blob => blob.arrayBuffer())
    .then(buffer => {
        const dataView = new DataView(buffer);
        const sign = dataView.getUint32(0, true);
        const filesCount = dataView.getUint16(10, true);
        const cdStartOffset = dataView.getUint32(16, true);
        console.log(sign, sign.toString(16), filesCount, cdStartOffset);

        fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0-win-x86.zip', {
            headers: {
                'range': `bytes=${cdStartOffset}-`
            }
        })
});
```

EOCD		
0	4	Маркер
4	2	Число дисков
6	2	Диск на котором расположена CD
8	2	Число CD на диске
10	2	Число CD
12	4	Размер CD
16	4	Смещение до первой записи CD
20	2	Длина комментария
22	n	Комментарий

```
fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0
    headers: {
        'range': 'bytes=-22'
    }
})
    .then(resp => resp.blob())
    .then(blob => blob.arrayBuffer())
    .then(buffer => {
        const dataView = new DataView(buffer);
```

EOCD		
0	4	Маркер
4	2	Число дисков
6	2	Диск на котором расположена CD
8	2	Число CD на диске
10	2	Число CD
12	4	Размер CD
16	4	Смещение до первой записи CD
20	2	Длина комментария
22	n	Комментарий

```
Range: <unit>=<range-start>-
Range: <unit>=<range-start>-<range-end>
Range: <unit>=<range-start>-<range-end>, <range-start>-<range-end>
Range: <unit>=-<suffix-length>
```

```
                headers: {
                    'range': `bytes=${cdStartOffset}-`
                }
            })
});
```

```
fetch('https://nodejs.org/dist/v16.18.0/node-v16.18.0-win-x86.zip', {
    headers: {
        'range': `bytes=${21953915 + 30 + 53}-${3529 + 21953915 + 30 + 53}`
    }
})
    .then(ответ => ответ.blob())
    .then(бинарь => {
        const потокРазархивации = new DecompressionStream('deflate-raw');
        const поток = бинарь.stream().pipeThrough(потокРазархивации);
        const чтец = поток.getReader();
        чтец.read().then(({ done, value }) => {
            const декодер = new TextDecoder();
            const файл = new File([декодер.decode(value)], 'README.md');
            const ссылка = URL.createObjectURL(файл);
            const якорь = document.createElement('a');
            якорь.download = 'README.md';
            якорь.href = ссылка;
            document.body.append(якорь);
            якорь.click();
        });
    })
```

Бонус пример №2

```
const JOSNPayload = {
    isAdmin: true,
    canEditData: false,
    canDeleteData: true,
}

if (JOSNPayload.isAdmin) { ... }

const binPayload = [1, 0, 1]; // 0b101 = 5

if(binPayload[1]) { ... }
```

```
const JOSNPayload = {
    isAdmin: true,
    canEditData: false,
    canDeleteData: true,
}

if (JOSNPayload.isAdmin) { ... }

const binPayload = [1, 0, 1]; // 0b101 = 5

if(binPayload[1]) { ... }
```

```
0xN - 16
0oN - 8
0bN - 2
```

Подытожим

- Мы можем редактировать файлы непосредственно в браузерном приложении
- Мы можем редактировать бинарные данные в потоках при отправке или загрузке
- Может быть полезно для работы с архивами или сжатием данных
- Можно использовать для оптимизации размера данных
- Можно генерировать и редактировать файлы на «лету»

Многопоточность

Пример

Index.js

```
const canvas = document.getElementById('canvas');
const button = document.getElementById('button');
const d = { w: 1000, h: 1000 };
canvas.width = d.w;
canvas.height = d.h;
const context = canvas.getContext('2d');

const map = new SharedArrayBuffer(2500);
const view = new Uint8Array(map);
view.fill(255);

const pos = () => Math.floor(Math.random() * (2500 - 0) + 0);
const randomColor = () => Math.floor(Math.random() * 16777215).toString(16);

const workersData = () => [
    { map, id: 0, start: pos(), end: pos(), color: randomColor() },
    { map, id: 1, start: pos(), end: pos(), color: randomColor() },
    { map, id: 2, start: pos(), end: pos(), color: randomColor() },
    { map, id: 3, start: pos(), end: pos(), color: randomColor() },
    { map, id: 4, start: pos(), end: pos(), color: randomColor() },
    { map, id: 5, start: pos(), end: pos(), color: randomColor() },
    { map, id: 6, start: pos(), end: pos(), color: randomColor() },
    { map, id: 7, start: pos(), end: pos(), color: randomColor() },
    { map, id: 8, start: pos(), end: pos(), color: randomColor() },
    { map, id: 9, start: pos(), end: pos(), color: randomColor() },

    { map, id: 10, start: pos(), end: pos(), color: randomColor() },
    { map, id: 11, start: pos(), end: pos(), color: randomColor() },
    { map, id: 12, start: pos(), end: pos(), color: randomColor() },
    { map, id: 13, start: pos(), end: pos(), color: randomColor() },
    { map, id: 14, start: pos(), end: pos(), color: randomColor() },
    { map, id: 15, start: pos(), end: pos(), color: randomColor() },
    { map, id: 16, start: pos(), end: pos(), color: randomColor() },
    { map, id: 17, start: pos(), end: pos(), color: randomColor() },
    { map, id: 18, start: pos(), end: pos(), color: randomColor() },
    { map, id: 19, start: pos(), end: pos(), color: randomColor() },
];

let k = 0;
let wd = [];

const n = 50;
const lineLength = view.length / n;
const step = d.w / lineLength;

const draw = () => {

    if (k === 0) {
        k = 20;
        view.fill(255);
        wd = workersData();
        wd.forEach(d => {
            const worker = new Worker('/index6w.js');
            worker.postMessage(d);
            worker.onmessage = () => {
                worker.terminate();
                k--;
            }
        });
    }

    context.fillStyle = '#FFFFFF';
    context.fillRect(0, 0, d.w, d.h);

    context.fillStyle = "#000000";
    context.font = "10pt Arial";

    for (let i = 0; i < view.length; i = i + n) {
        for (let j = 0; j < n; j++) {
            context.fillStyle = `#${wd.find(d => d.id === view[i + j])?.color ?? 'ffffff'}`;
            context.fillRect(j * step, i / n * step, step, step);
        }
    }

    for (let i = 1; i < lineLength; i++) {
        context.moveTo(0, step * i);
        context.lineTo(d.w, step * i);
        context.moveTo(step * i, 0);
        context.lineTo(step * i, d.h);
        context.stroke();
    }

    setTimeout(draw, 200);
}

draw();
```

worker.js

```
const field = new Array(2500);
let marked = [];
field.fill(Infinity);

const n = 50;
let id = 0;
let tempIndex = 0;
let startIndex = 0;
let endIndex = 0;

function doStep(view) {

    let neighbors = [
        tempIndex - 1,
        tempIndex + 1,
        tempIndex - n,
        tempIndex + n
    ]

    if (tempIndex % n === 0) {
        neighbors[0] = undefined;
    }
    if (tempIndex % n === n - 1) {
        neighbors[1] = undefined;
    }
    if (tempIndex + n > field.length) {
        neighbors[3] = undefined;
    }

    neighbors = neighbors.filter(n => n && !marked[n] && n > 0 && view[n] === 255);

    if (!neighbors.length) {
        let index = field
            .reduce((a, b, i) => !marked[i] && a[0] > b ? [b, i] : a, [Number.MAX_VALUE, -1]);

        if (index[1] >= 0) {
            marked[tempIndex] = true;
            tempIndex = index[1];
            return doStep(view);
        }
        else {
            return false;
        }
    }

    neighbors.sort((a, b) => field[a] - field[b]);

    for (let n of neighbors) {
        if (field[n])
            field[n] = field[n] > field[tempIndex] + 1 ? field[tempIndex] + 1 : field[n];
    }

    marked[tempIndex] = true;

    let index = neighbors.sort((a, b) => field[a] - field[b]).at(0);

    tempIndex = index[1];
    return true;
}


const findPath = (path) => {
    const index = path[path.length - 1];

    if (index === startIndex) {
        return path;
    }

    let neighbors = [
        index - 1,
        index + 1,
        index - n,
        index + n
    ]

    if (index % n === 0) {
        neighbors[0] = undefined;
    }
    if (index % n === n - 1) {
        neighbors[1] = undefined;
    }
    if (index + n > field.length) {
        neighbors[3] = undefined;
    }

    neighbors = neighbors.filter((n) => Number.isInteger(field[n]) && n > 0);

    if (!neighbors.length) {
        return [];
    }

    const min = neighbors.sort((a, b) => field[a] - field[b]).at(0);
    path.push(min);

    if (min === 0) {
        return path;
    }
    else {
        return findPath(path);
    }

}

const proc = (view) => {
    marked = [];
    field.fill(Infinity);
    field[startIndex] = 0;
    while (doStep(view)) { }
    return findPath([endIndex]);
}

onmessage = async ({ data }) => {
    const map = data.map;
    id = data.id;
    startIndex = data.start;
    endIndex = data.end;
    tempIndex = startIndex;
    const color = data.color;

    const view = new Uint8Array(map);

    console.log(`%c${id}%c start`, `background: #${color}; font-size: 16pt; padding: 0 8px`, 'color: white; font-size: 16pt');

    let path = proc(view);

    const fill = async () => {
        for (let idx = 0; idx < path.length; idx++) {
            let resolver;
            const promise = new Promise(resolve => resolver = resolve);
            setTimeout(resolver, 200);
            await promise;
            const res = Atomics.compareExchange(view, path[idx], 255, id);
            if (res !== 255) {
                console.log(`%c${id}%c rebuild at ${path[idx]} cos ${res}`, `background: #${color}; font-size: 16pt; padding: 0 8px`, 'color: white; font-size: 16pt');
                endIndex = path[idx - 1];
                tempIndex = startIndex;

                path = proc(view);
                path.shift();
                return fill();
            }
        }
    }

    await fill();
    console.log(`%c${id}%c stop`, `background: #${color}; font-size: 16pt; padding: 0 8px`, 'color: white; font-size: 16pt');
    postMessage('end');
};
```

Index.js

```
const map = new SharedArrayBuffer(2500);
const view = new Uint8Array(map);
view.fill(255);

…

wd.forEach(d => {
    const worker = new
Worker(‘/worker.js');
    worker.postMessage(map);
    worker.onmessage = () => {
        worker.terminate();
        k--;
    }
});
```

worker.js

```
const field = new Array(2500);
let marked = [];
field.fill(Infinity);

const n = 50;
let id = 0;
let tempIndex = 0;
let startIndex = 0;
let endIndex = 0;

function doStep(view) {

    let neighbors = [
        tempIndex - 1,
        tempIndex + 1,
        tempIndex - n,
        tempIndex + n
    ]

    if (tempIndex % n === 0) {
        neighbors[0] = undefined;
    }
    if (tempIndex % n === n - 1) {
        neighbors[1] = undefined;
    }
    if (tempIndex + n > field.length) {
        neighbors[3] = undefined;
    }

    neighbors = neighbors.filter(n => n && !marked[n] && n > 0 && view[n] === 255);

    if (!neighbors.length) {
        let index = field
            .reduce((a, b, i) => !marked[i] && a[0] > b ? [b, i] : a, [Number.MAX_VALUE, -1]);

        if (index[1] >= 0) {
            marked[tempIndex] = true;
            tempIndex = index[1];
            return doStep(view);
        }
        else {
            return false;
        }
    }

    neighbors.sort((a, b) => field[a] - field[b]);

    for (let n of neighbors) {
        if (field[n])
            field[n] = field[n] > field[tempIndex] + 1 ? field[tempIndex] + 1 : field[n];
    }

    marked[tempIndex] = true;

    let index = neighbors.sort((a, b) => field[a] - field[b]).at(0);

    tempIndex = index[1];
    return true;
}


const findPath = (path) => {
    const index = path[path.length - 1];

    if (index === startIndex) {
        return path;
    }

    let neighbors = [
        index - 1,
        index + 1,
        index - n,
        index + n
    ]

    if (index % n === 0) {
        neighbors[0] = undefined;
    }
    if (index % n === n - 1) {
        neighbors[1] = undefined;
    }
    if (index + n > field.length) {
        neighbors[3] = undefined;
    }

    neighbors = neighbors.filter((n) => Number.isInteger(field[n]) && n > 0);

    if (!neighbors.length) {
        return [];
    }

    const min = neighbors.sort((a, b) => field[a] - field[b]).at(0);
    path.push(min);

    if (min === 0) {
        return path;
    }
    else {
        return findPath(path);
    }

}

const proc = (view) => {
    marked = [];
    field.fill(Infinity);
    field[startIndex] = 0;
    while (doStep(view)) { }
    return findPath([endIndex]);
}

onmessage = async ({ data }) => {
    const map = data.map;
    id = data.id;
    startIndex = data.start;
    endIndex = data.end;
    tempIndex = startIndex;
    const color = data.color;

    const view = new Uint8Array(map);

    console.log(`%c${id}%c start`, `background: #${color}; font-size: 16pt; padding: 0 8px`, 'color: white; font-size: 16pt');

    let path = proc(view);

    const fill = async () => {
        for (let idx = 0; idx < path.length; idx++) {
            let resolver;
            const promise = new Promise(resolve => resolver = resolve);
            setTimeout(resolver, 200);
            await promise;
            const res = Atomics.compareExchange(view, path[idx], 255, id);
            if (res !== 255) {
                console.log(`%c${id}%c rebuild at ${path[idx]} cos ${res}`, `background: #${color}; font-size: 16pt; padding: 0 8px`, 'color: white; font-size: 16pt');
                endIndex = path[idx - 1];
                tempIndex = startIndex;

                path = proc(view);
                path.shift();
                return fill();
            }
        }
    }

    await fill();
    console.log(`%c${id}%c stop`, `background: #${color}; font-size: 16pt; padding: 0 8px`, 'color: white; font-size: 16pt');
    postMessage('end');
};
```

Index.js

```
const map = new SharedArrayBuffer(2500);
const view = new Uint8Array(map);
view.fill(255);

…

wd.forEach(d => {
    const worker = new
Worker('/worker.js');
    worker.postMessage(map);
    worker.onmessage = () => {
        worker.terminate();
        k--;
    }
});
```

worker.js

```
onmessage = async (map)=> {
    …
}

const res = Atomics.compareExchange(
    view,
    path[idx],
    255,
    Id
);
```

worker.js

```
onmessage = async (map)=> {
    …
}

const res = Atomics.compareExchange(
    view,
    path[idx],
    255,
    Id
);
```

Atomics

```
Atomics.compareExchange(
    TypedArray,
    index,
    expectedValue,
    replacementValue
);
```

Атомарно записывают/читают/следят за указанными ячейками массива, гарантируя доступность одному процессу за раз.

Подытожим

- Мы можем использовать многопоточный и безопасный доступ к памяти
- Полезно при работе с эмуляциями файловых систем и реализации многопоточности в **wasm** приложениях

Комплексный пример

Спасибо!





